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OIL-ETHER COLONIC ANESTHESIA.

JAMES TAYLOE GWATHMEY, M.D.,
NEW YORK.

Rectal anesthesia was of little practical value until Cunningham of Boston used air as a vehicle for the introduction of the ether vapor, and it is almost unnecessary to state that the original work of Cunningham and Sutton's improved technic and careful record of cases were most important factors in the development of oil-ether colonic anesthesia.

PHYSIOLOGICAL EFFECTS OF OIL-ETHER COLONIC ANESTHESIA ON THE ORGANISM.

In a very short time after entering the rectum the oil-ether mixture becomes heated to body temperature. As this occurs some of the ether leaves the oil in the form of gas and is absorbed by the blood circulating in the small capillaries surrounding the colon, and thence into the greater circulation. It then passes through the lungs, where part of it is excreted and lost, the remainder is immediately reabsorbed and thus reaches the brain. Blood pressure remains constant.

As a large quantity of the vapor is lost by exhalation the *brain* is never as deeply narcotized as when routine inhalation methods of anesthesia are used. Sensory paralysis of the extremities is first produced with this method and the higher centers of the brain are the least affected. In recovery from anesthesia consciousness is regained long before sensations of pain are manifested.

Although the reflexes are active there is a great degree of relaxation throughout the *muscular system.*

Four factors acting in harmony tend to automatically maintain an even plane of anesthesia: (1) the *constant rate of evaporation* of the ether from the oil; (2) the *distension of the colon,* for when the colon is distended less ether is absorbed than when it is only partially distended; (3) as the ether leaves the oil both the *mixture* and the *gut* are *cooled,* which retards elimination and absorption; and (4) the difference between the *absorptive power* of the *colon* and the *eliminative capacity* of the *lungs.*

INDICATIONS AND CONTRAINDICATIONS.

Oil-ether colonic anesthesia is indicated in (1) neurotics and cases in which fear is pronounced, as in goiter; (2) obese individuals with narrowed air passages; (3) for *bronchoscopy, gastroscopy,* and all operations upon the *respiratory tract, head, neck and chest.*

The technic is contraindicated in cases (1) in which ether is contraindicated, except when the patient has been ill from a previous etherization; (2) *colitis, hemorrhoids, fistulae* and other pathological conditions of the lower bowel; (3) when considerable rectal pain is caused by the introduction of the solution.

AFTER-EFFECTS.

The after-effects are reduced to a minimum and compare most favorably with the post-anesthetic sequelae following routine methods of administering ether or chloroform. The method has been used to anesthetize consumptives, asthmatics and patients afflicted with bronchitis, and in no instance has the previous condition of the patients been made worse.

THE TECHNIC OF ADMINISTRATION.

The patient. The administration of oil-ether colonic anesthesia is best accomplished with the patient in the *Sims position in his own bed.* If the patient is in a ward, the *bed should be screened.* Exposure of the patient may be avoided by introducing the rectal tube between two suitably adjusted sheets. The patient should be kept very quiet and should never be left alone at any time after having received the injection.

Apparatus. The only apparatus required consists of a special rectal tube ¼ inch in diameter and about 28 inches long; a clamp for this tube; a 3-inch funnel into which to pour the mixture and a Gwathmey tube about 30 inches long and ⅜ inch in diameter. These should be sterilized before use.

Preliminary treatment. Give a cathartic of castor oil the night preceding the operation. Avoid purging. Follow this in the morning by warm water enemas, one hour apart, until the return is clear. Then allow the patient to rest for 2 or 3 hours.

(1) *One hour* before operation give slowly per rectum, with the patient in the Sims position,

Chloretone	5 to 20 gr.
Oil-Ether Mixture, aa	2 to 4 dr.

The chlorotone may be given separately in a suppository, or some other hypnotic of equal value may be used.

(2) *Half an hour* before operation give by hypodermic injection,

Morphin	1/8 to 1/4 gr.
Atropin	1/150 to 1/100 gr.

Instead of the above, in alcoholics or athletes, *two hours before operation* give 1/100 gr. of hyoscin hydrobromid hypodermatically and *one hour* before the operation repeat the hoyscin with ¼ gr. morphin, omitting the rectal preliminary.

No preliminary medication is needed for children under 9 years of age.

Induction. Twenty minutes before the operation administer the oil-ether mixture very gradually, one ounce per minute, through the funnel attached to the cathether, which has been well lubricated and inserted 4 inches within the rectum.

(1) Mixture for adults:
Olive Oil .....2 oz.
Ether .....6 oz.
(2) Mixture for weak, anemic patients:
Olive Oil .....45 to 25 per cent.
Ether .....55 to 65 per cent.
(3) Mixture for children:
Ether-Oil, aa. .....50 per cent.

proaches the danger zone, as indicated by the *loss of the lid reflex, slight cyanosis or stertor,* withdraw 2 or 3 ounces of the mixture remaining in the colon. If this is insufficient, introduce a Connell breathing tube to lighten the anesthesia, or transfuse 1,000 to 2,000 c.c. of normal saline solution intravenously. If *respiratory arrest* occurs, place a bag filled one-third full of carbon dioxid over the face and use artificial respiration. If narcosis is too light, a towel placed over the face and slightly puckered just above the nose and mouth, but held securely to the face around the edges, will deepen it.

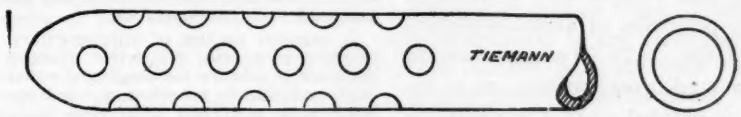

FIG. 180.—GWATHMEY RECTAL IRRIGATION TUBE.

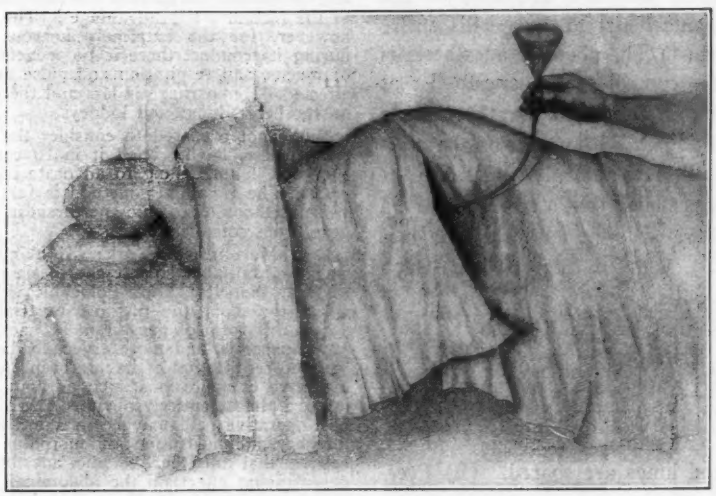

FIG. 181A.—SHOWING PATIENT IN POSITION FOR OIL-ETHER ADMINISTRATION.

Introduce one ounce of the oil-ether mixture for every 20 pounds of body weight, except for obese persons. Eight ounces of a 75 per cent. mixture will maintain anesthesia from 2½ to 3 hours. *No more than 8 ounces should ever be given.* If the patient goes to sleep before the required amount has been given, STOP! If narcosis is much delayed, a few whiffs of chloroform may be used.

Keep an unobstructed airway at all times by manipulating the jaw as in inhalation anesthesia, and by preventing the head falling forward or sideways, or the tongue dropping back, thereby cutting off the air supply.

Maintaining surgical anesthesia. In surgical narcosis *breathing is quiet and regular;* the reflexes are active and the pulse normal. If the patient ap-

AFTER-TREATMENT.

At the conclusion of the operation irrigate the rectum immediately with cold soap-suds and at the same time massage the colon gently from right to left in order to expel any liquid that may remain. Withdraw one tube. Introduce 2 to 4 ounces of olive oil and 1 pint to 1 quart of water and withdraw the remaining tube from the rectum.

THE LATEST TECHNIC.

Recently by using paraldehyde as the preliminary, the necessary amount of oil-ether mixture has been reduced one-third to one-half.

Preliminary medication. Administer per rectum, one hour before operation,

Morphin. Alk. ..... ⅛ gr.
Paraldehyde .....1 dr.
Oil-Ether, aa. .....3½ dr.

Induction. With this preliminary follow the previously indicated technic, except that, instead of a hypodermic, this dose *should be repeated* for *alcoholics,* athletes and patients weighing over 160 pounds. Routine cases require no further preliminary medication. In administering the 75 per cent. oil-ether mixture, use one ounce to every *40 pounds of body weight.* One drachm of parldehyde used in this way seems to be equivalent to 2 ounces of the 75 per cent. oil-ether mixture.

ADVANTAGES.

(1) Oil-ether colonic anesthesia can be administered to patients in bed, without their knowledge, thus fulfilling many principles of anoci-association as enunciated by Crile. (2) The apprehension caused by placing a mask over the face, as in inhalation anesthesia, is avoided. (3) The apparatus required is inexpensive and the simplicity of the technic enables the anesthetist to devote his entire time to the patient. (4) The plane of anesthesia is completely under the control of the anesthetist at all times. Any error in judgment may be quickly rectified by the addition or withdrawal of the mixture. (5) Narcosis is automatically maintained at a level plane of surgical narcosis. (6) In over 95 per cent. of cases there is no eructation of gas during anesthesia. (7) With normal patients such complications as colitis, bloody stools or blood streaked returns do not occur. Oil-ether apparently is much less irritating to the colonic mucus membrane than ether vapor is to the mucus membrane of the respiratory passages. (8) Hypersecretion of mucus and saliva are absent and the patient's stomach and lungs are spared. (9) Post-operative vomiting, nausea and gas pains are reduced to a negligible minimum. (10) The patient recovers consciousness in an analgesic state. (11) The limits of safety are extended on account of the gradual and equal absorption of ether from the colon and its rapid elimination from the lungs. The factor of safety is further emphasized by the fact that Dr. W. H. Park, Director of the Bureau of Laboratories of the Department of Health of the City of New York, has found that the oil-ether mixture of 75 per cent. kills the colon bacillus in one minute, while the 50 per cent. solution kills the bacillus in 10 minutes. As the colon bacillus is an important infective agent, post-operatively, the oil-ether solution acts as a desirable prophylactic against possible infection.

In conclusion it may be stated that the principal factor of safety is the wide margin between the dosage requisite for surgical narcosis and that which precipitates toxemia.

ABSTRACT OF DISCUSSION.

Dr. J. E. Lumbard, New York: From an experience of 80 cases I have found that a thorough mixing of the oil and ether by shaking them in a closed bottle best control rectal irritation and too rapid absorption. Chloratone does not seem to obviate reflex symptoms during the injection. Children are not as satisfactory subjects as adults. Preliminaries should be personally supervised, and when possible evacuations in the sitting posture greatly facilitate the cleansing of the lower bowel.

During the injection of the oil and ether it is not necessary to introduce the cathether more than three inches or hold the funnel more than one foot above the level of the rectum. Constant and firm pressure over the rectum until the patient is completely anesthetized is a technical detail of importance. Also patients should not be moved from bed until ready for operation.

A minimal amount of supplementary narcosis may be required in a small proportion of cases. The technic is particularly adapted to "stealing the thyroid," and is especially valuable in bronchoscopy and operations about the head, neck and chest. The time required for thorough preparation, the prolonged stage of post-operative narcosis, and the contraindication of the method in irritative lesions of the rectum are disadvantages. The technic is available, however, for the extremely nervous and insane. Also during its conduct there is no tendency to hypersecretion of mucus, and respiration and pulse are not pronouncedly affected. Hemorrhage is less and there is a decreased tax on the heart, lungs and kidneys.

While not prepared to consider the method fool-proof, nevertheless, having tried it in 80 cases for 15 different surgeons, I am willing to advocate its use in appropriate cases. The Gwathmey method is far superior to all previous methods of colonic anesthesia in its results and freedom from complications.

R. S. Morton, New York: Speaking as a surgeon, after a trial of oil-ether colonic anesthesia in 15 abdominal sections at the New York Polyclinic Hospital, I am rather optimistic about the method, especially because patients accept this form of anesthesia far more readily than inhalation narcosis, and more especially because they seem to have no recollection of having been operated on, and post-operative complications such as pain, nausea and vomiting are almost entirely obviated. While the obtunding of post-operative pain may be in a measure due to the preliminary administration of morphine and chloratone, I believe that oil-ether colonic anesthesia has a peculiar desensitizing effect on the abdominal viscera, and is also greatly responsible for the pain-free period after operation lasting from four to sixteen hours.

The integrity of the bowel is in no way affected. None of my cases developed symptoms of irritation of the colon and gas distress presented in only one patient with angulations of the intestines. Respiration, pulse and temperature, taken before, during and at periods after operation, showed markedly less alterations than under routine methods of inhalation narcosis. Kidney function is not materially affected.

Dr. H. Arrowsmith, Brooklyn, N. Y.: Colonic oil-ether anesthesia is really an "epoch-making" discovery in the evolution of narcosis, particularly as applied to the domain of oral, laryngeal and border-line surgery. Laryngological colleagues are finding the method of especial value in bronchoscopic and esophogoscopic cases, where the extraction of foreign bodies is concerned, for the operator may go ahead with his work, uninterruptedly, regardless of the anesthetist and without the annoyance, at critical junctures, of a partial return to consciousness of the patient, which may mean failure of the operative procedure. The method offers a safe, uniform surgical plane of narcosis that persists, with little or no participation on the part of the anesthetist, for two hours. I have employed the technic in cleft palate operations, resections of the jaw and nasal bones, in extensive attacks on the accessory sinuses, laryngostomies and endolaryngeal operations

with the suspension laryngoscope. One of my confreres uses it, by preference, for submucus resection of the septum.

While the skill of Dr. A. F. Erdman made previous methods of rectal ether vaporization satisfactory for operative procedure about the head, face and neck, these older technics cannot compare in efficiency, safety or ease of administration with that developed by Dr. Gwathmey.

Dr. Cantle: During the past two months I have supervised the administration of oil-ether colonic anesthesia to 38 children, ranging in age from 2½ to 11 years, for tonsil and adenoid operations. Fear and struggling, so common under inhalation methods, were entirely obviated, as the attending nurse handled the preliminary treatment. In the older children ⅛ gr. of morphine was given by mouth one hour before operation and chlorotone, 5 gr., by rectum, immediately preceding the oil-ether. Patients became anesthetized in from 10 to 20 minutes. Supplementary etherization was necessary by inhalation in only one instance, and in another case the onset of anesthesia was delayed for 40 minutes owing to poor preparation of the lower bowel.

Dr. Schmidt, Atlantic City: The elimination of the element of fear is the greatest asset of oil-ether colonic anesthesia. The method was satisfactory in 13 cases coming under my personal observation, and there were no bad results following. In only one instance was it necessary to administer a few drops of chloroform to secure greater relaxation of the abdominal musculature. When the indications for its use are more fully understood, this method of Dr. Gwathmey will be more generally used.

Dr. Dye: After an experience with this method in 29 cases, I can corroborate the results secured and observed by those who have participated in this discussion.

Dr. C. K. Teter, Cleveland: In closing the discussion, I would ask Dr. Gwathmey to indicate whether various positions of the patient under anesthesia such as the Trendelenburg, or the head-up postures, affect the depth of oil-ether colonic anesthesia?

Dr. J. T. Gwathmey (closing): In my experience the posture of the patient does not seem to affect the depth of anesthesia by the oil-ether colonic method. Absorption does not seem to vary much in respect to the rectum or descending colon. It is a pleasure to realize that expert anesthetists are taking up oil-ether colonic anesthesia as an available method for certain operative procedure, and the exchange of experiences and the grouping of results will serve to perfect the method.

40 East Forty-first Street.

RESUSCITATION IN THREATENED FATALITIES DURING NARCOSIS OF GENERAL ANESTHETIC AGENTS.*

E. H. Embley, M.D., B.Ch.,
Melbourne, Victoria, Australia.

The more definite knowledge now possessed as to the causation of death from general anesthetic agents renders it easy, in experimental work, to recognize the physiological defaults involved in its occurrence. In clinical practice the problem is not so simple, since pathological complications frequently are combined with the physiological to obscure the interpretation. For clearness in discussion it is well to class the various factors in anesthetic fatalities into groups, such as the following: (1) syncope; (2) excessive intoxication; (3) shock; (4) pathological states and various accidental circumstances.

It is not uncommon in prolonged, or such operations as are known to cause more rapid circulatory depression, to find that shock and excessive intoxication together contribute to the depression. Shock, too, may be precipitated by pathological states, such as status lymphaticus, and by accidental circumstances such as excessive hemorrhage. Also syncope, although usually operating alone, is usually the culmination of an overwhelming toxemia.

Syncopal cases may be divided into dangerous and non-dangerous types. Concerning the latter it is unnecessary to say more than that the patient's face becomes pale, the pulse either much reduced in rate or volume and tension. Such cases recover upon withdrawal of the anesthetic agent. In the more dangerous forms of syncope the pulse and circulation cease abruptly, with consequent facial pallor and widely dilated pupils. Respiration is usually embarrassed, or ceases at the same time as the circulation. Such syncopal attacks usually occur during the induction of narcosis, or just after, although reflex syncope can occur at any later period during the maintenance of anesthesia.

The physiological factors concerned in the causation of syncope are the combined exaitation of excitability of the cardio-inhibitory and arterio-dilator mechanisms. The heart is inhibited and the arteries are relaxed. Whether the heart can release itself from the inhibition and the circulation become restored depends upon the degree of myocardial depression suffered, or otherwise upon the remaining degree of responsivity to stimuli, and possibly upon the extent of the compensatory rise of venous pressure. This rise of venous pressure is inversely proportional to the degree of general intoxication. The respiration fails mostly from bulbar anemia, and to a lesser extent from the anesthetic toxemia. Hence this form of circulatory failure is not paralytic, but rather the result of exalted excitability of the nervous mechanisms mentioned.

The circulatory failure due to excessive intoxication differs sharply from syncope in being essentially paralytic. The cardio-vascular musculature is paralyzed, and the central nervous system is greatly depressed. This form occurs experimentally when the vagi are divided and the anesthetic agent is delivered by artificial respiration. Clinically its occurrence is very rare, owing to the fact that further accessions to the tension of the anesthetic agent already in the blood are shut off by the failure of respiration before the circulation ceases. Artificial

*Read before The British Association for the Advancement of Science, Melbourne, 1914.

respiration lowers this tension and restores the normal gaseous interchange. Cardiac inhibition due to excessive anesthetic intoxication usually occurs later in the course of the administration and its onset is less sudden than that of syncope. The color leaves the face more slowly, the pulse diminishes in volume and tension, but the rate remains practically unaltered during the progressive fall in blood pressure, unless associated with shock, in which instance the pulse rate increases proportionally with the degree of shock or the rate may be retarded or arrested by the onset of cardiac inhibition, the excitability of the vagi being exalted by the low blood pressure as well as by the anesthetic agent.

Levy has shown that ventricular fibrillation occurs when sufficient adrenalin is added to the blood during experiments under chloroform narcosis. Sudden heart block has also been observed in cats during chloroform narcosis, without the addition of adrenalin; but the vagal form of cardiac arrest occurs more commonly during experimental narcosis with chloroform on dogs. Corresponding retardation in pulse rate, culminating in cardiac arrest, is not infrequent in clinical cases under chloroform narcosis.

The pathology of shock, which has been a subject for much controversy in recent years, seems now a more or less settled question. Exhaustion of adrenal function, as shown by Elliott, seems to be sufficient to account for the low arterial and venous tensions, and the consequent chain of shock—phenomena dependent upon defective blood supply.

The clinical indications of circulatory failure due to shock are increasing pallor, defective lung ventilation, diminution of the tension and volume with an increased pulse rate—the rate being an approximate guide to the severity of the state of shock, excepting in some instances of extreme age, in which the rate does not appreciably alter.

Some of the more important pathological states and various accidental circumstances that must be considered are: drowning by fluids filling the bronchi from below, or entering by way of the larynx from above; laryngeal obstruction by blood, vomit or foreign bodies; spasm or edema of the glottis; Ludwig's angina; retro-pharyngeal abscess; goitre; cerebral tumor; excessive hemorrhage; status lymphaticus; septic and fatty degenerations of the myocardium; valvular lesions and inadequately compensated hearts.

TREATMENT OF SYNCOPE.

Every effort in the treatment of syncope should be directed to restarting the heart. The physiological indications are: (1) raising the venous blood pressure in the right heart cavities and in the large veins adjacent; (2) artificial respiration. The physiological rise in venous blood pressure appears to exert a stimulus on the restoration of the sino-autricular rhythm. As this rise in pressure is impaired in the syncope of excessive intoxication from anesthetic agents, it must be supplemented by rotating the patient into the head-down position, and artificial respiration; the former aiding by the gravitation effect, and the latter by aspirating the splanchnic veins. The good head of venous pressure, moreover, furnishes adequate blood volume for filling the arterial system when the heart is restarted. The artificial respiration furthermore aids in restarting the heart and by the alternate compression and decompression of the pulmonary alveoli, the respiratory nervous mechanism is reflexly stimulated.

Rhythmic compression of the heart through the diaphragm, although entailing the opening of the abdomen in some cases, should always be tried if the previously mentioned measures fail. Experimentally, I have invariably succeeded in restarting the heart in this way; but have always failed in cases of myocardial paralysis from excessive intoxication as well as in cases in which the myocardium was pathologically impaired.

Hypodermic and inhalation resuscitative measures are ineffectual when there is no circulation.

TREATMENT OF EXCESSIVE INTOXICATION.

If the circulation and respiration still continue, simple withdrawal of the anesthetic agent is sufficient; or if the former continues, but the latter has ceased, artificial respiration must be resorted to. If the heart has ceased, no resuscitative measure will restart it. Experimentally, I have rapidly lowered the tension of the anesthetic agent in the myocardium, and restored the heart's action, by perfusion of isotonic salt solution through the coronary arteries, but this technic has no clinical value, on account of the pulmonary edema which ensues, and the difficulty of the surgical operation entailed. Rotation into the head-down position, artificial respiration, and rhythmic compression of the heart through the diaphragm are useless, but they should be tried in all cases, since there is a probability that syncope has completed the heart block, and in the presence of some excitability in the myocardium, resuscitation may be accomplished. Medicinal remedies are equally ineffectual since the circulation has ceased.

Prevention of syncope or of excessive intoxication is best attained by the pre-anesthetic injection of morphin and atropin and by the use of ether,

ether-oxygen, or nitrous oxid-oxygen, instead of chloroform, for anesthesia.

TREATMENT OF SHOCK.

The indications are: (1) To raise the blood pressure in the cavities of the right side of the heart and in the great veins adjacent, by inverting the body, head downwards, and by artificial respiration; (2) by restoring the body heat. Should the face color be good, inversion alone, without artificial respiration, will often suffice. In the presence of defective lung ventilation, warm oxygen inhalation usually proves helpful.

Saline infusion is not indicated, except in collapse from loss of blood. A plethoric rise of arterial blood pressure, induced by transfusion, is rapidly lost on account of the transudation of the fluid into the surrounding tissues. Ergot and pituitrin are useful in mild degrees of shock only. Adrenalin raises both the arterial and venous blood pressures, but its effect is transient, unless delivered in the vein continuously in a concentration of 1 in 500,000. In its use the pulse must serve as an indication to prevent cardiac inhibition or ventricular fibrillation. The flow of the solution should be almost stopped when the pulse falls to 60 per minute.

Operative shock is best combatted by using morphin and ether for general anethesia. Their superior obtundent attributes induce more effective depression in the reflex arcs. Also dread of the operative procedure may be almost entirely obviated by proper preliminary morphinization. Spinal anesthesia may be employed for the same purpose in selected cases. Neither clinically nor experimentally have I found the obtundent efficiency of nitrous oxid so great as that of ether.

TREATMENT OF ACCIDENTAL AND PATHOLOGICAL CONDITIONS.

In cases of threatened drowning by flooding of the bronchi, the patient should be promptly inverted head downwards and artificial respiration started immediately. If this proves ineffective the bronchi should be aspirated through the opened trachea or larynx, and perflation of oxygen used. Where the blood enters from below as in the rupture of a hydatid cyst, the sound side should be promptly turned uppermost, and blood clots, vomited masses, and foreign bodies hooked out of the larynx with the finger or a small sponge on a holder. Inducing an artificial cough by the sudden bimanual compression of the chest will often clear the larynx. When these measures fail, prompt laryngotomy is necessary. This also applies to edema of the glottis and other causes of prolonged laryngeal closure by spasm. A preliminary injection or atropin and light ether narcosis tends to obviate respiratory failure in cases of cerebral compression with a slow pulse rate.

Goitre cases are best operated upon under light ether narcosis preceded by an injection of morphin and atropin.

Cases with edema of the glottis, or retro-pharyngeal abscess, Ludwig's angina, or status lympaticus are too hazardous risks for general anesthesia and should invariably be operated upon under local analgesia. Cases of collapse from hemorrhage should be operated in the head-down position and continuous infusion of adrenalin-saline solution used as previously explained, under control of the pulse rate. The feeble, aged, the septic and the markedly anemic cases with myocardial weakness, all cases with imperfectly compensated and degenerated myocardium are best anesthetized by ether with the addition of oxygen, and unless contraindicated by the condition of the kidneys or of the respiration, morphin and atropin or scopolamin should be injected beforehand. Also, all operative procedures on these hazardous risks should be rapidly completed and the body warmth well maintained.

Morphin in rare instances markedly raises the threshold of the central nervous mechanism of respiration to carbon dioxid, the rhythm falling to even five or six per minute. Unless anoxemia results, it is unnecessary to use oxygen. Administration of carbon dioxid restores the normal rate. The dose of morphin should never exceed 1/6 grain.

Operations upon the thorax are preferably performed under Meltzer's intratracheal insufflation method of anesthesia. Ether pneumonia being almost entirely due to inspiration of buccal flora in the copiously secreted saliva and mucous. The preliminary use of morphin and atropin obviates the abnormal salivary and bronchial secretions, and thereby practically prevents post-anesthetic ether pneumonia.

Providing that the morphin is given before the onset of imperiling acidosis, its employment is a prophylactic measure against the baneful effects of general anesthetic agents upon diabetics.

245 Latrobe Street.

THE AMERICAN ASSOCIATION OF ANESTHETISTS WILL HOLD ITS THIRD ANNUAL MEETING DURING THE PANAMA-PACIFIC EXPOSITION, AT SAN FRANCISCO, JUNE 19, 1915.

LOCAL ANESTHESIA IN MAJOR SURGERY WITH ILLUSTRATIVE CASES.

F. G. DuBose, M.D., F.A.C.S.,
Surgeon to Vaughan Memorial Hospital and Burwell Infirmary,
Selma, Alabama.

In over 700 anesthetic fatalities between 1910-1913, collected from the English press by Flemming, and recently reported to the Anesthetic Section of the Royal Society, some 223 deaths occurred before the operative procedure was begun. It is a notorious fact that statistics with reference to anesthetic fatalities are incomplete, so that Flemming cannot be accused of exaggeration. The actual death-rate under general anesthesia far exceeds the recorded rate as estimated from newspaper reports and the verdicts of coroners' juries.

The immediate effects of chloroform and ether in precipitating acidosis, or producing paralytic ileus, complicates the post-operative course and retards or prevents the patient's expected recovery. The remote effect of ether on the kidney is to cause anuria, nephritis or acetonuria, while chloroform with its delayed toxemia produces fatty degeneration and necrosis of the hepatic cells. Both of these anesthetic agents may also be directly responsible for destructive changes in the cells of the central nervous system.

Nitrous oxid-oxygen is at present the nearest approach to a harmless method of general anesthesia. It has its disadvantages, however, such as the difficulty of administration, the necessity for an expert anesthetist; the expense involved; its failure to ensure the necessary relaxation for certain operative procedures; its dangers in the extremes of life; its comparative inefficiency in the presence of drug-habituation, alcoholism or individual idiosyncrasy. Its usefulness as an adjunct to local analgesia, as the perfecting detail of Crile's anoci-association cannot be questioned, and in this combination technic it becomes available for practically any operation of general surgery, and is safer than and equally as satisfactory as ether or chloroform narcosis.

Oil-ether colonic anesthesia (Gwathmey), while possessing certain advantages in special operative procedures and systemic conditions, has shown a questionable mortality in the cases in which it has been employed, so far; and considerably more data must become available before the technic can be unreservedly indorsed. In its peculiar field it has many indications for use.

Spinal anesthesia is beset with technical difficulties and harmful consequences, that place a narrow limitation on its utility.

While local anesthesia alone or in combination with nitrous-oxid-oxygen is now available for all operations of general surgery, the occasional necessity for using large quantities of the local analgesic agents prohibits the employment of cocain on account of its toxicity. Alypin and novocain are less poisonous, but are still sufficiently so to involve considerable danger when excessive amounts are demanded by the exigencies of the operative procedure.

Bimuriate of quinin and urea is a non-toxic drug, efficient in harmless dilutions, effective in its obtunding qualities, easy of administration, and free from inconvenient complications on the tissues infiltrated. There is but one demonstrated danger in its use—*concentrated solutions.* A strength above one per cent., in some instances, will produce necrosis of the infiltrated tissues with consequent gangrene or sloughing. Concentrated solutions producing this complication are unnecessary, since a dilution of one-fourth of one per cent. is sufficient for obtunding the tissues; and solutions of this minimal strength do not produce exudation of fibrin in sufficient amount to retard healing or interfere with the subsequent vitality of the injected tissues.

The use of quinin as a local anesthetic was first reported in 1896, by Griswold of Fredonia, N. Y., before the Chautauqua Medical Society. Dr. Henry Thibault of Scotts, Ark., in 1907, demonstrated the efficiency of quinin-urea hydrochloride, hypodermically, as a local analgesic in one per cent. solution; and topically for mucous membranes in from ten to twenty per cent. solutions. Three years later, Hertzler, Brewster and Rogers of Kansas City reported their scientific researches regarding and clinical results with quinin-urea hydrochloride as a local analgesic.

Hertzler and Crile, are particularly responsible for the present wide-spread use of this analgesic agent in general surgery, and while Crile is very enthusiastic about the perfection of his anoci-association methods, Hertzler is inclined to be more circumspect in his claims. My personal experience with this analgesic agent has been so favorable as to warrant a general outline of the technic of its use and the report of some interesting illustrative cases.

The preliminary preparation of the patient is the same as that employed for routine operations under general anesthesia. One hour before the operation the patient is given ¼ grain morphin and 1/150 grain atropin, hypodermatically. The position on

the operating table is made as comfortable and free from strain as possible. The patient's confidence is gained and diverting conversation indulged in during the preliminary preparation, and throughout the operative procedure, when the surgical exigencies of the case permit. The operative field is painted with 5 per cent. iodin in alcohol, and infiltration of the tissues, for a distance of several inches around the line of incision, begun.

In patients of nervous or hypersensitive temperaments, the first puncture is made endermically with a one per cent. novocain or cocain solution, using not to exceed fifteen to thirty minims. Through this blanched and obtunded skin area, a needle of a 20 c.c. syringe is passed into the subcutaneous areolar tissue, and the area surrounding the site of incision infiltrated. Manual pressure over this infiltrated area not only diffuses the analgesic agent, but hastens the obtunding effect and renders it more complete. The proposed line of incision through the skin is now blanched with the novocain or cocain solution, as was done for the initial puncture. This gives the quinin-urea hydrochloride solution time to block the nerves supply of that area surrounding the incision, which would ordinarily remain sensitive to touch and traction.

The skin is now rapidly incised down to the aponeurosis of the muscle, which is in turn infiltrated. Meanwhile any bleeding points that present are ligated, thereby insuring an interval for the aponeurotic infiltration to desensitize the parts. The aponeurosis of the muscle is incised, and the peritoneum exposed. The perietal peritoneum must be thoroughly infiltrated for an area of several inches surrounding the proposed incision. Unless this step in the technic is carefully carried out, the relaxation desirable for intra-abdominal manipulations will not be secured.

Once the peritoneal cavity has been invaded extreme gentleness in the handling of the visceral anatomy must be observed. The viscera may be pushed aside or walled off in the usual manner, except that no traction must be made on the mesentery, since such traction immediately produces shock and elicits considerable pain. If the necessity for traction arises, the mesentery must be infiltrated. In operations on the uterine adnexa, the broad ligaments should be similarly infiltrated; likewise the neck of the gall-bladder and the meso-appendix, in gall-bladder and appendix operations, respectively.

All nerves exposed during the operative procedure should be blocked either by peri- or endoneural injection. It is important to preserve the integrity of all neural structures, especially in operations for hernia, under local analgesia, as such a precaution seems to play an important part in preventing recurrences or postoperative hernias. In amputations of the extremities, the larger nerves should be exposed and endo-neurally injected several inches above the operative field. Care and attention to minor details in nerve blocking, will go far in the effectual prevention of shock. Extreme degrees of shock may be precipitated under local analgesia by failure to completely and thoroughly obtund all the tissues and neural structures in the operative field, or by making undue traction on ligaments and pedicles. Extreme gentleness must be observed in all surgical manipulations. The nerves accompanying the larger arteries should be infiltrated, and should never be included in the hemostatic ligature, as this fault in technic may give rise to severe postoperative pain.

The following operative cases have been selected from the clinics of the Vaughan Memorial Hospital and Burwell Infirmary, to illustrate the wide range of local anesthesia in major surgery, and to demonstrate the accomplishment of such surgery under very adverse circumstances. The majority of these cases presented contra-indications to the use of ether or chloroform, and the consequent use of local anesthesia, in several instances at least, prevented, in my opinion, a fatal outcome.

ILLUSTRATIVE CASES.

Case 1. Mr. H. M., age 55, operated on Feb. 12, 1912. Extreme emaciation. Food retention. Vomiting. Past history peptic ulcer. Diagnosis, pyloric obstruction. A median four-inch incision between the umbilicus and ensiform cartilage. Gall bladder, bile duct and the head of the pancreas palpated. Pylorus brought into the wound, found cicatricial stenosis, no evidence of carcinoma. Finney's pyloro-plasty done. Operative time, one hour. Patient had absolutely no pain, carried on a lively conversation with Dr. Chisolm, who had his usual place at the anesthetist's end of the table. Post-operative course smooth and uninterrupted, primary healing throughout. The patient left the hospital on the fourteenth day. His present condition two years after is good.

Case 2. Maggie P. operated on May 13th, 1913. Colored, age 36. Brought to the hospital in a wagon. Fecal vomiting. Extreme distention of the abdomen. Pulse 120, temperature 97. Skin cold and clammy. Eyes sunken, expression anxious. No movement of the bowels in three days. Diagnosis of intestinal obstruction. Given a hypodermic of morphin and atropin. Prepared for the abdominal section under local anesthesia. Five-inch incision, made from the level of the umbilicus to near the symphisis pubis. On opening the abdominal cavity a large distended coil of ileum presented. This was drained by a rubber tube introduced into the lumen and invaginated into its walls. Emptying the gas and fecal matter permitted a search for the site of obstruction. Two constricting bands were found, one four inches and the other six inches from the ileocecal junction. One of these bands had almost severed the gut. The intervening two inches was so devitalized that resection was done. The patient complained of no pain during the entire operation, and at the end expressed a feeling of great relief from the agony she had been suffering for several days before she was admitted to the hospital. The drainage tube in the gut

was brought out at the lower end of the incision, and the wound closed. A quart of 4 per cent. soda solution was introduced into the gut through this tube and the patient returned to bed in good condition. The tube was removed from the bowel on the sixth day and on the twenty-second day she was dismissed from the hospital, cured; her wound healed.

Case 3. F. W., Colored, age 50, operated on May 1, 1913. Seen first at 6 P. M., seventy hours after the beginning of strangulated hernia. This man had fecal vomiting, persistant hiccough, enormously distended, pulse 130, temperature 101. Skin cold and clammy. He was immediately removed to the hospital and the inguinal canal and sac were opened, and ten inches of necrotic gut were resected, end to end anastomosis. An enterostomy was done 2½ inches above the anastomosis, and a number sixteen catheter introduced into the gut, and passed through the anastomatic line and invaginated, and the end brought out of the abdomen through a stab wound. A modified Bassini operation done for the radical cure of hernia. The abdomen was closed and the tube allowed to drain off. Then two quarts of sodium bicarbonate solution was introduced slowly through the tube and allowed to drain immediately. Every two hours thereafter a pint of 10 per cent. glucose and 2 per cent. solution of soda was introduced through this tube. The tube clamped for one hour, and allowed to drain off for another hour. The stomach was washed out immediately and every four hours thereafter until the end of the next day. The glucose and soda solution was introduced by the Murphy drip per rectum for three days, after which he was able to retain nourishment, and his convalescence was uninterrupted. He is at present at work, and his hernia is completely cured.

Case 4. Mrs. C. operated on Aug. 22, 1913; age 50, multipara, widow. Gall stones and empyema of the gall bladder. This patient had been treated for organic heart disease, and her attacks of colic had been mistaken for angina pectoris for two years. From prolonged starvation she was in such a reduced and weakened condition that a general anesthetic was contra-indicated. Under quinin-urea anesthesia an incision was made over the distended gall bladder, the same exposed, the intestine packed off, the gall bladder aspirated, removing 8 ounces of pus. The opening was enlarged and 38 medium sized stones removed. The gall bladder was drained, the wound closed up around the drainage tube. Her recovery was uninterrupted and she has gained 50 pounds since her operation. During the operation she engaged in conversation with the assistant and the nurses, and complained of no pain during the entire time.

Case 5. Mr. D., age 78, operated on Sept. 9, 1913. Right inguinal hernia, enormous scrotal sac extending to near the knee. The entire operative area was blocked off with quinin-urea solution and radical cure of his hernia done. The appendix was in the hernial sac; there were dense adhesions between the omentum and the sac wall. These were separated without pain, the omentum ligated and returned to the abdomen with the intestines sac dissected out and ligated. The operation was completed without pain or incident, the patient was allowed to be up in a rolling chair the day following the operation, and was kept up every day until he was discharged completely cured of his hernia eighteen days subsequently.

Case 6. Dr. T., age 80, operated on Sept. 7, 1913. Came for the relief of persistent suprapubic urinary fistula following prostatectomy two years before. The irritation of the skin was extreme, and extended from the upper abdomen to below the knee. He had passed no urine through his urethra since the operation for the removal of his prostate. Examination showed a tortuous urinary fistula extending down posterially to and below the pubic bone. Sounds introduced into the urethra met an obstruction in the membranous portion of the urethra, the one and one-fourth inches of the prostatic urethra being entirely obliterated. Under local anesthesia a perineal urethrotomy was then done, and an effort was made to enter the bladder by the use of filiforms and sound through this blind proximal and the prostatic urethra. As this could not be accomplished, a suprapubic cystotomy was done, dissecting out the old fistulous tract to near its exit from the bladder down and just above the original urethral opening. The bladder was opened near the reflection of the peritoneum and an examining finger introduced finding complete obliteration of the vesico-urethral orifice. The fistulous opening could be palpated about one inch above the point where the urethral opening should have been. A straight sound was passed into the blind end of the membranous urethra from the perineal opening and forced through the old prostatic scar into the bladder. The opening was dilated and a catheter introduced for perineal drainage with the expectation that a new urethra would form. The opening in the fundus of the bladder was closed around a large drainage tube. The subsequent treatment of the patient was the same as that employed in the usual prostatic cases. Except for the eczema which was present when he came and which existed for months from a long continued soiling by the urine, this old man's convalescence was uneventful. He is voiding his urine naturally, and the perineal and suprapubic openings, and the fistulous tract have closed. I wish to say that the original prostatectomy was not done by me, and this deplorable condition resulted from either faulty technic or some avoidable incident or accident subsequent to the original operation. His gratitude can well be imagined, as he is changed from a walking urinal to a gentleman of normal habits and actions.

Case 7. D., colored, age 86, operated on March 3, 1914. Thrown from a buggy and fractured the femur at the junction of the middle with the upper third. Sent to the hospital and a Hodgen's splint used. Gangrene in the foot developed. Under local anesthesia after blocking the sciatic and anterior crural nerves, amputation was satisfactorily done to the point where the fractured bones overlapped each other. In spite of infiltration around the periosteum, there was considerable shock when the lower fragment was dislodged. This old man developed anuria, and died from uremic coma four days after. This case demonstrates the fact that shock can arise even with local anesthesia, and that death can follow operations when done under local anesthesia.

CONCLUSIONS.

1. The number of fatalities occurring with melancholy regularity from the anesthetic alone should attract the serious attention of all surgeons.

2. Local anesthesia should be employed in all cases adapted to its use and where general anesthesia is contra-indicated.

3. The combination of local anasthesia with general anesthesia to shorten the time of inhalation narcosis and to block the nerves, thus lessening shock and permitting the employment of nitrous oxid gas, should be more generally adopted in the performance of major operations. Sloan's admonition that, "nitrous oxid gas is the safest known anesthetic in the hands of the expert and the least safe in the hands of the inexperienced," should be remembered.

4. Extreme gentleness and careful respect for the tissues in the course of the operation, and painstaking technic are essential.

5. The instruments must be well chosen. The needle for the syringe, and the knives and the scissors used in dissection must be of keen edge. Pulling on structures must be avoided, and tearing or blunt dissection find no place in the surgical technic under local anesthesia.

6. The patient must have faith in the operator, who in turn must have confidence in himself.

7. It must be borne in mind that no anesthetic is fool proof or free from danger, and that only by the minutest attention to details of the technic and with extreme patience in its execution can performance of major surgery under local anesthesia be accomplished.

Selma, Alabama.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS WILL HOLD ITS ORGANIZATION MEETING AT CINCINNATI, OHIO, MAY 4-5, 1915. AN ELABORATE PROGRAM WILL ALSO BE PRESENTED.

KIDNEY FUNCTION AND ANESTHESIA.

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In order to understand clearly the changes in urinary output which follow anesthesia it is necessary to detail first some of the factors that help to maintain a normal secretion.

Modern writers like Hans Meyer and Gottlieb[1] hold that we are still far distant from a complete understanding of the mechanism of urinary secretion on purely physico-chemical grounds. While strictly speaking this is no doubt true, it is questionable whether there is anything gained by slipping back into the older teachings of the Heidenhain School and saying that a kidney secretes because it is able to. Certain it is that the last decade has helped to a better formulation of the physico-chemical conditions which are the sine qua non for secretion, and equally certain is it that the gains thus made may be used to advantage clinically.

Martin H. Fischer[2] has given us on a colloid-chemical basis a clear and logical explanation, supported by uncontroverted experimental facts, of the mechanism by which the body holds under varying conditions not only a normal amount of water but also such abnormally large quantities as are characteristic of edema.

He holds that the water in the body is not free, but is held as hydration water in combination with the protein colloids; and that the body cannot take up any more water or give off any except as the state of these colloids is first changed. Water does not become available for urinary secretion, therefore, except as it is first brought to the kidneys in a free state.[3] The blood and tissues hold under normal circumstances what we call a constant amount of water. Water taken into the body in excess of the amount necessary for this saturation remains free in the blood and is excreted in some form, as from the skin, the lungs, the bowel, or as urine. The amount of water held by the blood and tissues is determined by the state of their colloids, which in turn is dependent upon the amount and kind of acid, alkali or salts contained in them. Thus, if their acid content is raised, more water is held by the tissues, in other words, an edema follows. When more water is thus held, less free water remains over to be available for secretion.

While an edema may affect any organ, it is a more serious state in some than in others. An edema of the brain is more serious than one of the skin, for example. Especially may an edema be serious in its effects if the involved organ is hampered in its swelling. Such hampering makes things worse, for the swelling organ then tends to shut off its own blood supply. This is true, for example, of the kidney, which being surrounded by a firm capsule, can only swell to a limited degree before it begins to shut off its blood supply. With the lack of oxygen thus produced, a diminished kidney function (as betrayed by a diminished urinary secretion) becomes progressively worse and may go on to complete suppression, *anuria*.

We are indebted to Hans Meyer and E. Overton for explaining why narcotics, such as the anesthetics, while capable of affecting all living cells, produce their greatest effects in the higher animals upon the central nervous system. Because of their greater solubility in the fats and fatlike bodies— *the lipoids* —they accumulate in greater concentration and more quickly in the central nervous system and the adipose tissues than elsewhere in the body.

The best explanation of *why* they act anesthetically is given by Verworn. This author has shown that anesthetics enter into loose physico-chemical combination with the lipoids, wherefore these lose their normal relation to the other cell constituents. As a result, the entire chemistry of the cell is inhibited. Among the results of this inhibition is a lessened absorption or utilization of oxygen. But whenever the oxygen supply to any cell or organ is thus cut down an abnormal increase of its acid content results. But such, in its turn, by increasing the capacity of the involved tissues for water is followed by edema. It is this edema which makes the anesthetized subject after the anesthesia feel *dry* and call for water. The very fact that the patient is thirsty and that his tissues are therefore not saturated with water means, of course that there can be no free water in the body. This fact is betrayed through the kidneys, which show it by a diminished urinary secretion.

The chemical effect of the anesthetic upon the chemistry of the whole body evidences itself in certain qualitative and quantitative changes. There is, for example, an increased hydrogen ion and titration acidity observable on examining the urine and a diminished chlorid output. At the same time the presence of incompletely oxidized bodies, as acetone and diacetic acid and betaoxybutyric acid, may be found. If the resultant acid intoxication is severe, albumin and casts appear in the urine and an increased ammonia elimination may be observed. The presence of albumin and casts means that the acid intoxication has gone so far in the kidney that parts of it have gone into solution. The presence of acetone and diacetic acid means that carbohydrate

and fat metabolism has been so upset that they are not completely oxidized, as normally, into carbon dioxide and water. The retention of chlorids by the tissues goes hand in hand with increased acidity and is due to this acidity. An increase in the acid content of a tissue not only leads to a retention of water—*edema*—but to a retention of certain salts at the same time.

These considerations show that *urinary secretion is possible only when free water circulating in the blood is brought to the kidney, and that an anesthetic produces the effects it does because it leads to a lack of oxygen in the tissues of the body. This raises their acid content, and makes them absorb more water from the blood, which in its turn diminishes in that proportion the amount available for secretion.* The kidney secretion diminishes not because of a specific poisonous effect of the anesthetic upon the kidney alone, but because of this effect upon all the tissues and organs of the body.

During the latter part of 1913, assisted by Grace McKenna, I examined 400 post-operative urines at the St. Francis Hospital in San Francisco. I found 94.2 per cent. of the cases to show a marked increase in the hydrogen ion acidity. Forty-nine per cent. showed acetone or acetone and diacetic acid. Twenty-six per cent. showed albumin and casts. Whenever these findings were noted there was also found a low chlorid output. In the great majority of cases only a trace was excreted. The surgical series embraced about everything for which operations are made. The average time per operation was 55 minutes; the average amount of ether given, 120 c.c. The post-operative symptoms of nausea, vomiting, headache, and gas pains paralleled completely in their intensity the intensity of the changes noted in the urine.

This very evident parallelism between degree of acid intoxication and certain post-operative findings which have been and still are regarded as largely unavoidable and necessary consequences of operative interference suggested the probability that much could be done to make these patients not only better surgical risks, but also to make their post-operative history freer from complications than is now the case, if only some well recognized physiological facts were utilized in surgical practice. This has been found to be possible to a remarkable extent, not only in my own cases, but in those of some of my colleagues. We have made it a rule, where emergency did not interfere, to discover in all cases before operation how heavily *acidosed* our patients are, and then not to operate until through proper feeding and by the administration of alkalies such acidosis has been overcome.

In this connection it should be clearly borne in mind that much clinical misinformation exists in clinical and surgical circles to-day as to the question of when a patient is really *acidosed*. This word should be used as synonymous with *acid intoxication*. An acid intoxication is revealed by a persistently high hydrogen ion acidity,[4] or titration acidity of the urine,[5] by a high ammonia coefficient,[6] by a low carbon dioxide concentration in the blood or expired air, and by the inability to hold the breath as long as normally.[7] Ordinarily it is said that the appearance of acetone, diacetic acid, and betaoxybutyric acid is evidence of an *acidosis*. This is not the case. It is *qualitative* evidence of a disturbed body chemistry from which an acid intoxication may result, but obviously, an organism may be poisoned to death with even the *normal* acids formed in body metabolism, while, on the other hand, even a great production of *abnormal* acids may leave the body uninjured, if only enough alkali is constantly available to neutralize the acids as formed.

These facts have been utilized as guides to a more scientific pre-operative preparation of the surgical patient and his subsequent post-operative care. Most pre-operative preparation used to be, and in some places still is, of a type to guarantee from the outset a maximum of discomfort and even danger to the patient. Routine examination of the patients to be operated on, even when not suffering from infections or intoxications likely to be complicated by nephritis, show that in the days before their operations they are usually pushed into a state in which post-operative complications are very likely to appear. Commonly the urine shows a high hydrogen ion concentration. Such patients make poor surgical risks, and should be given the advantage of preliminary treatment. The mental anxiety so common in surgical cases expresses itself physiologically by increased muscular tone, and this declares itself in the high acid findings in the urine. How much the intelligent reassurance of the surgeon must mean to such patients is obvious.

Patients are also too commonly ordered upon a *light* diet. In this way the acid products of a starvation diet are added to those already present from other sources. Unless there are specific reasons against it, a surgical patient should be fed to within six hours of his operation, and since carbohydrate starvation is the commonest and earliest form, special attention should be paid to getting an easily assimilable sugar-starch ration into him.

I usually order the protein intake cut down somewhat, and put in its stead more carbohydrates. The use of mushes, oatmeal cooked for three hours and served with plenty of sugar, malted milk, or any of

the prepared foods that contain maltose and dextrose in an easily assimilable form does very well.

In addition, the patient should be given *water,* as urinary secretion is only possible by furnishing a sufficient quantity of free water. It must be remembered that large quantities of *pure* water alone tend to wash the salts out of the tissues. This may be met by combining with the water salts up to a *physiological* concentration, and alkalies. Natural or artificially prepared mineral waters are particularly easily borne by the patient and when these contain a maximum amount of calcium they are particularly satisfactory, for a lack of calcium seems to be responsible for many of the so-called *acidosis* effects. The amount given should be regulated by the urinary reaction. I see that my patients reach the operating table with their urine alkaline to litmus or rosolic acid, and passing at least 1,500 c.c. urine a day. If a water containing calcium is not readily available, I give calcium acetate in gram (15 grain) doses three or four times in the twenty-four hours in addition to whatever water I use.

The feeding of carbohydrate and the use of water, alkali, and salt should be started, if possible, at least two or three days before the anticipated operation either at home or in the hospital, and continued until the patient has a urine persistently neutral to litmus or rosolic acid. He should enter the operating room in this condition. A patient who goes to the operating table with a highly acid urine, or with a high ammonia coefficient, or with products showing a disturbance in his carbohydrate metabolism, *acetone and diacetic acid,* is a bad surgical risk.

I see that the bowels are moved just before the operation. I use instead of the ordinary enema one consisting of a quart or two of water containing one or two ounces of bicarbonate of soda. This the patient is allowed to reject in the ordinary way, but since all does not come out, a considerable dose of alkali is thus given the patient just before he is subjected to his increased surgical acidosis, the result of his anesthesia, his acid production from the pain of the operation, and his post-operative suffering.

Patients prepared as I have outlined recover rapidly from the effects of their anesthesia. They are without headache, *absence of brain edema;* they vomit little or none at all, *absence of edema of the medulla;* they urinate an hour or two after the operation, *absence of kidney edema and early presence of free water;* the urine is practically free from albumin and casts and excess of ammonia. Moreover, the traumatized tissues at the seat of the operation swell less and are less painful, due also to the decreased edema.

The choice of anesthetic should receive consideration. The toxic effects of an anesthetic, as far as the kidneys are concerned, deserve consideration from several standpoints. In the first place, no anesthetic, be this chloroform, ether, or nitrous oxid, can produce its desired effects without interfering with the oxidation chemistry of the body. In fact, anesthesia depends largely, if not entirely, upon such effect. We need not, however, add to this load by giving the patient too little oxygen. One of the superior merits of nitrous oxid anesthesia resides not so much in the anesthesia itself as in the fact that oxygen accompanies it. Nor may we say offhand that the bad effects of an anesthesia are simply a function of its length and the quality of anesthesia used. Alvin Powell found in a carefully studied series of operative cases that when but little anesthesia was used, and perfect muscular relaxation was not obtained, the patients showed more casts and albumin in the urine than when they were anesthetized longer and more deeply. On the other hand, very deep anesthesia was again followed by more albumin and casts. I have noted the same facts in experimental work on rabbits.

These findings are to be interpreted as follows: The bad effects avoided by use of but little anesthesia are more than counterbalanced by those incident to the great acid production consequent upon imperfect muscular relaxation. The imperfectly anesthetized subject responds with muscular contraction to the irritation due to surgical trauma. A medium degree of anesthesia increases the toxic effect of the anesthetic, but eliminates the acid factor due to muscular rigidity. In deep anesthesia a maximum of interference with normal oxidation chemistry is again assured by the anesthetic itself.

Similar conditions hold in determining the value of morphin, atropin, scopolamin, and similarly acting drugs administered before or after an operation. Their bad effects on the oxidation chemistry of the tissues may be offset by the assurance of better muscular relaxation, with the elimination of acid production from this source.

I always give scopolamin (gr. 1/200) and morphin (gr. 1/6) one hour before operation, as I find that less anesthetic is necessary under these conditions, and in a patient properly alkalinized with plenty of free water available for secretion there is no danger in this. By this means one obtains better muscular relaxation and hence less acid production which more than overbalances the bad effects of the narcotic alone.

The value of local anesthetic measures, in the use of novocain, quinin, and urea hydrochlorid, as in

nerve blocking and in tissue infiltrations, is similarly explained. Their use prevents pain impulses from reflexly expressing themselves in increased muscular tone. I infiltrate each layer with 0.25 per-cent. novocain and block the area with 0.2 per cent. quinin and urea hydrochlorid.

By following such simple details the good surgical patient is not only kept so, but many a bad one bordering on an acid intoxication is not pushed over the line into a serious or perhaps fatal terminal state. Cheerful surroundings, confidence in surgeon and nurse, proper anesthesia, and the blocking of peripheral impulses keep the acid production in the body low, while carbohydrate feeding, alkali, salts, and water push the danger threshold further away. The latter elements protect the body against the effects of the operation—the intoxication of the anesthetic and the acid effects due to post-operative suffering.

Following operation, the patient is allowed an alkaline mineral water either plain or as a fruit-ade. Early administration of the juice or pulp of grapefruit and oranges with sugar works excellently. The fruit acids are oxidized to carbonates so that these foods represent a feeding of alkali. If there is no vomiting I start carbohydrate feeding by mouth within a few hours after the operation. Sweetened fruit juices, hot or cold malted milk, and candy I find excellent.

In cases of marked toxemia, especially in victims of a subacute or chronic infection, more sugar than can be given by mouth should be administered. In this type of case the rectal administration of 4,5 per cent. anhydrous dextrose by the drip method works very well.

Up to the present we have contented ourselves with dealing with the rôle of the acids in the production of edema in the different organs of the body. Recent experimental work by Martin H. Fischer and Anne Sykes[8] shows that urea, pyridin, and some of the amins lead to marked hydration of proteins. This observation seems to be of fundamental importance in connection with the edemas associated with the infections, for many of the bacterial toxins are amin in character. The point of interest about the edemas produced by the amins is that they are different in type from those produced by acid, for while the latter are relievable by the use of bases and salts, those produced by urea and the amins are not thus influenced. On the other hand, the sugars, which influence acid edemas but little, dehydrate this second type of edema tremendously.

Martin H. Fischer and Anne Sykes[9] have also shown that the sugars dehydrate the body as they dehydrate simple proteins. The diuretic action of the sugars depends upon this fact and like the saline cathartics the sugars act as diuretics primarily, not because of a specific action upon the kidney, but because they dehydrate the tissues of the whole body. The degree of diuresis increases with every increase in the concentration of the sugar.

Especially in the toxemic cases have I found the sugars to produce excellent results. The dextrose not only acts as a food and thus furnishes the necessary carbohydrate so often lacking in the body, but it is a powerful dehydrator. In this second capacity it reduces the swelling of edematous organs, such as the kidney, brain, liver, and bowel, while secondarily it leads to a liberation of water, thus increasing the urinary output. Clinically, I have found the rectal or intravenous injection of sterile, hypertonic anhydrous dextrose solutions—up to 18 per cent.—to produce most spectacular results in anuria, ileus, coma, persistent vomiting, and glaucoma.

I hope that these few remarks may have helped to a better scientific understanding of why sugars, alkalies, and salts which in one way or another have been used empirically for generations in the care of the surgical patient, really accomplish their purpose.

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291 GERRY STREET.

Be progressive and attend either the American or Interstate Anesthetists' Meeting.

ORAL ANESTHESIA WITH SPECIAL REFERENCE TO SURGICAL OPERATIONS FOR CHRONIC ALVEOLAR ABSCESSES.

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Local anesthesia has assumed an important rôle in minor as well as in major surgery, but in no special procedures has it so many advantages over general anesthesia as in oral surgery and operations on the teeth. Not only are the disadvantages of general anesthesia for intraoral operations many, but there are also unavoidable dangers associated with its administration.

DISADVANTAGES OF GENERAL ANESTHESIA FOR INTRAORAL OPERATIONS.

The administration of a general anesthetic for an operation in the mouth requires the co-operation of an expert anesthetist. The oral surgeon, as a rule, has a competent assistant or calls on an experienced anesthetist to take charge of this important phase of the procedure; while the dentist, in general practice, frequently uses his secretary or lady assistant for this purpose. Not having had any scientific training in the use of anesthetics, these latter are usually absolutely incompetent. Existing surgical standards are just as grossly violated by the man who has the idea that he can be anesthetist and operator at the same time. Intraoral operations performed under the unfavorable conditions brought about by general anesthesia require the greatest possible skill and the undivided attention of the operator. The responsibility of administering a general anesthetic should, therefore, be taken from the shoulders of the operator; nor should his entire concentration on the necessary surgical technic be distracted by efforts to run one of the more or less complicated machines used by modern anesthetists for the administration of general anesthesia by the nasal or oral methods.

The necessity for a skilled anesthetist is the least of the disadvantages of general anesthesia in safeguarding the patient. Nitrous oxid-oxygen and somnoform, as administered by the incompetent, even in a careless manner, are comparatively safe in spite of the fact that many administrators possess little of the anatomical, physiological, and therapeutical knowledge or the technical skill to safely render a patient unconscious.

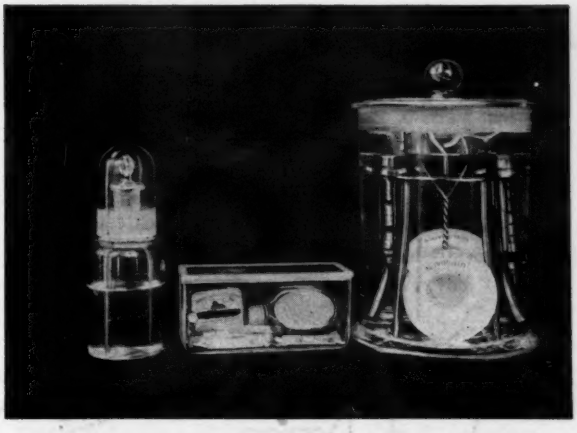
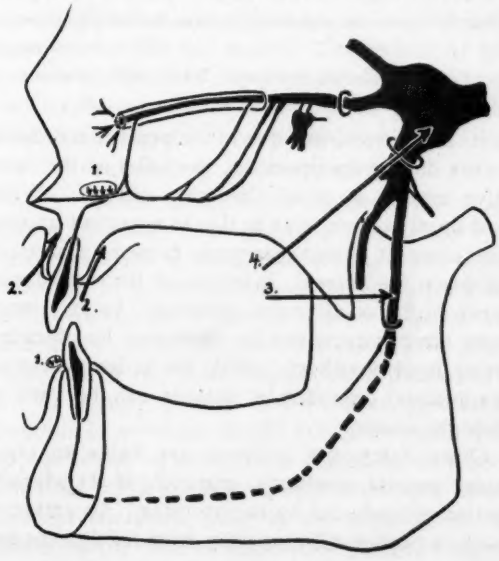


Fig. 1. Instruments used in connection with local anesthesia. Bottle for normal salt or Ringer solution. Tray for drugs and reserve needles. Jar filled with absolute alcohol, in which are kept two syringes and two dissolving cups. One syringe with 26 m.m. iridio-platinum needle for infiltration anesthesia, the other with a 42 m.m. iridio-platinum needle for conductive anesthesia. The dissolving cups are used to measure and boil the solution made by dissolving the tablets in the normal salt or Ringer solution. The syringe is filled direct from the cup.

The real disadvantages of general anesthesia for intraoral operations are the following: (1) The inability of the patient to co-operate with the oral surgeon, which counts for a great deal, especially when operating in the back of the mouth; (2) manipulation or instrumentation is rendered more difficult on account of the space occupied by mouth props or gags; (3) the operative field is continually obscured by saliva and blood—the venous bleeding being increased under some of the general anesthetics; while under local anesthesia the field may be rendered anemic to any desired degree. The oozing under

Fig. 2. This illustrates the different methods of local anesthesia in the oral cavity. (1) Surface Anesthesia; (2 Infiltration Anesthesia; (3) Conductive Anesthesia; and (4) Ganglion Anesthesia.



general anesthesia requires sponging and this occupies an assistant almost continually, thereby prolonging the operation considerably. Although rigid asepsis in the mouth is usually considered unnecessary, I am of the opinion that the greatest possible efforts towards an aseptic result should be made. The blood mixed with the saliva, which rapidly overfloods the mouth, presents the greatest danger for infection, as almost any bacteria can be found in it; and if vomiting, due to the general anesthetic, occurs during the operation, the toilet of the operative area is so much the more difficult. While post-operative pain may be due to operative traumatism alone, it is also commonly caused by bacterial action on the nerves. Infection of the wound may occur during or after the operation. In very many cases complications can be eliminated by operating under local anesthesia, using the ordinary aseptic precautions, especially if sutures can be used to close the wound.

Other dangerous incidents are liable to occur under general anesthesia, especially if its administration is conducted by the operator. An extracted tooth or portion of it may slip from the forceps and pass into the trachea, the protective reflex action being inhibited by the narcosis. Likewise large amounts of blood may be swallowed, causing nausea and vomiting, and there is additional danger of lung infection from aspirated blood and saliva.

METHODS OF LOCAL ANESTHESIA FOR INTRAORAL OPERATIONS.

The use of local anesthesia for intraoral operations requires a thorough anatomical knowledge of the operative area and its nerve supply, scrupulous asepsis, exact technic, and suitable instruments (Fig. 1). It is a principle in modern methods to separate the induction of local anesthesia from the operation proper, having an interval during which anesthesia deepens. There are four different methods of inducing local anesthesia in the oral cavity (Fig. 2):

1. Surface anesthesia.
2. Infiltration anesthesia.
3. Conductive anesthesia.
4. Ganglion anesthesia.

While all these methods are available, each has its limits and indications.

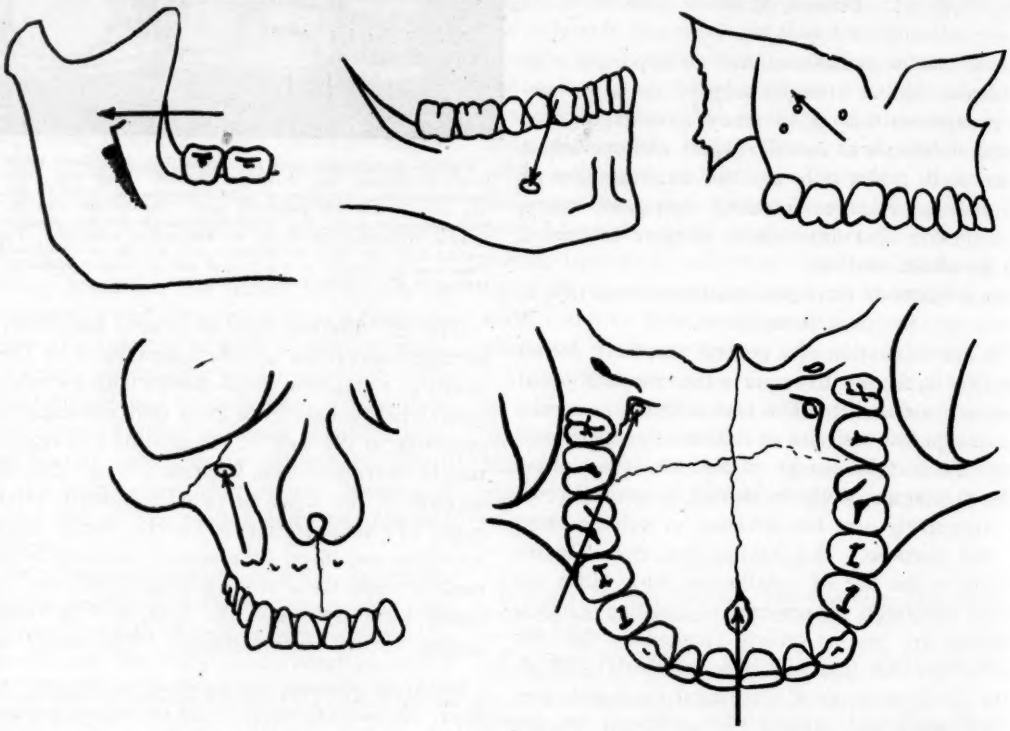


Fig. 3. Conductive Anesthesia: Pterygo-Mandibular Injection.

Fig. 5. Conductive Anesthesia: Zygomatic Injection.

Fig. 4. Conductive Anesthesia: Mental Injection.

Fig. 6. Conductive Anesthesia: Infra-Orbital Injection.

Fig. 7. Conductive Anesthesia: Incisive and Posterior-Palatine Injections.

1. SURFACE ANESTHESIA.

This method is accomplished by the application of local analgesics and its efficiency depends on the absorbing quality of the mucous membrane. Its utility is very limited and it has generally no deep action.

2. INFILTRATION ANESTHESIA.

In this method the mucous membrane, skin, and deeper tissues are infiltrated with the anesthetic solution, and the dental nerves, before they enter the teeth, are anesthetized by the absorption of the analgesic agent through the pores of the alveolar process. The deeper action of this method is only practical for the maxillary teeth and the four mandibular incisors, because of differences in the oseous structure of the maxilla and mandible.

Generally speaking, with this method, the injection is made directly into the field of operation, thus anesthetizing the peripheral nerve endings. Anesthesia is complete in a very short time, usually in about five minutes, after which interval small surgical or such dental operations as extraction of the tooth and extirpation of the dental pulp may be painlessly performed. This method is contraindicated in septic conditions.

3. CONDUCTIVE ANESTHESIA.

Conductive anesthesia is the ideal method of producing anesthesia in the oral cavity. The injection is made at a point remote from the field of operation, and a comparatively large area can be successfully obtunded with one small injection. Here the conductivity of a whole nerve trunk can be intercepted at a convenient point, and a complete anesthesia of the peripheral area of its distribution secured.

For more extensive operations, especially if anemia of the operative field is desired, it is better to combine the infiltration with the conductive method.

There are six convenient places in the oral cavity where conductive anesthesia can be readily induced:

(a) *The Pterygo-Mandibular Injection.* The pterygo-mandibular space is the space between the internal surface of the ramus mandibularis and the pterygoid muscles and outlined by the sulcus mandibularis. In this space, which is filled with connective tissue, the inferior alveolar nerve enters the mandibular foramen (Fig. 3). If this nerve is injected at this point, we get anesthesia of half the lower jaw, including the teeth and lower lip. The lingual nerve may be included in this injection, resulting in anesthesia of the lingual gum and side of the tongue.

(b) *The Mental Injection.* The solution is injected into the mental foramen to anesthetize the anterior portion of the inferior alveolar nerve (Fig. 4).

(c) *The Spheno-Maxillary Injection.* This injection is used to secure anesthesia for more extensive operations about the upper jaw. The solution is injected into the spheno-maxillary fossa, anesthetizing practically the whole second division of the trigeminal nerve. Ordinarily sufficient anesthesia may be obtained by anesthetizing the larger branches of the second division, supplying the parts upon which we are going to operate.

(d) *The Zygomatic Injection.* The three maxillary molars and soft tissues at the buccal side are supplied by the posterior superior alveolar branches, which can be reached and injected at the zygomatic surface of the maxilla (Fig. 5).

(e) *The Infra-Orbital Injection.* By forcing the solution through the infra-orbital foramen into the infra-orbital canal, anesthesia of the peripheral distribution of the infra-orbital nerve, which supplies the anterior teeth and labial gum, may be secured (Fig. 6).

(f) *The Incisive Injection.* The naso-palatine nerve can be blocked where it emerges through the incisive foramen, resulting in anesthesia of the anterior third of the palate (Fig. 7).

(g) *The Posterior Palatine Injection.* This injection can be used to anesthetize the lateral half of the posterior two-thirds of the palate, by blocking the anterior palatine nerve as it emerges through the larger palatine foramen.

4. GANGLION ANESTHESIA.

Injections can be made directly into the Gasserian Ganglion for some of the largest surgical operations of the face and mouth. The technic of this injection is difficult to acquire and it should be practiced on the cadaver on account of its value in the treatment of trigeminal neuralgias.

PREPARATION OF THE SOLUTION.

At the present time the best substitute for cocain in local anesthesia is novocain. Suprarenin, a synthetic compound to replace adrenalin, is the safest admixture to secure anemia of the operative field. In this connection, while the use of novocain has eliminated much of the toxic element in local anesthesia due to the use of cocain, nevertheless, as I have previously pointed out, standard percentage strengths of novocain should not be exceeded, and the admixture of suprarenin should be cautiously controlled. The toxic symptoms presenting under novocain anesthesia may, in the majortiy of instances, be traced to too high a percentage of supra-

renin, and in consequence in my routine work I have materially reduced its percentage as present in the novocain-suprarenin tablets offered by the trade. I accomplish this dilution by combining two standard formulas with varying quantities of normal salt or Ringer solution.

These standard formulas are as follows

Formula E.

Novocain	0.02 gram.
Suprarenin Synthetic	0.000,05 gram.

Formula F.

Novocain	0.05 gram.

Ringer Solution Tablets.

Sodium Chloride	0.050 gram.
Calcium Chloride	0.004 gram.
Potassium Chloride	0.002 gram.

Sig. Dissolve ten tablets in 100 c.c of distilled water and sterilize.

For normal cases use 1 F and 1 E tablet dissolved in 3½ C.C. normal salt or Ringer solution. This gives a solution containing:

Novocain	2 per cent.
Suprarenin Syn.	0.000,015 gram. to 1 c.c.

For abnormal cases, cardiac disorders, arteriosclerosis, nephritis, hysteria, use 2 F tablets and 1 E tablet dissolved in 6 C.C. of normal salt or Ringer solution. This gives a solution containing:

Novocain	2 per cent.
Suprarenin Syn.	0.000,009 gram. to 1 c.c.

For deep anemia for local injections, to render the field of operation anemic, use 1 E tablet to each c.c. or normal salt or Ringer solution. This gives a solution containing:

Novocain	2 per cent.
Suprarenin Syn.	0.000,05 gram. to 1 c.c.

REQUIREMENTS OF SOLUTIONS PREPARED FROM TABLETS.

1. The solution should be used immediately after it has been prepared.

2. The solution should not come in contact with anything except the porcelain cup in which it is sterilized and the syringe. It should not be left longer than absolutely necessary either in the dissolving cup or syringe, as the solution is very sensitive, being affected and chemically changed by air, heat, light, and especially by alkalies.

3. The tablets should not be touched by hands or instruments and the tube should be closed immediately after use with a rubber stopper. The tablets are readily changed by air, light, and especially by exposure to moisture.

4. The tablets should be white. If the uppermost tablets in the tube are discolored from chemical changes caused by improper handling of the tube, they should be discarded, as their use involves danger.

5. The solution made from the tablets should be crystal clear. If it shows any light pink color it must be discarded.

6. The normal salt or Ringer solution should be freshly prepared from distilled and sterilized water.

SURGICAL TREATMENT OF ALVEOLAR ABSCESSES.

Since physicians and dentists have been using the *X*-ray more freely as a means of diagnosing conditions of that portion of the tooth which is embedded in the alveolar process, they have become aware of the enormous number of alveolar abscesses that have heretofore gone undiagnosed. There are two types of alveolar abscesses divided according to the difference in their clinical aspects.

The first kind is connected with the oral cavity by a sinus, through which the purulent exudate escapes.

The second type is the so-called *blind abscess* and is located either at the end or side of the root, and as there is no outlet the exudate cannot flow into the mouth.

(a) *Alveolar Abscess with Sinus.* This first type is easily noticed; the patient is usually aware of the condition, although, generally, there is no physical suffering connected with it. The purulent matter which continually escapes into the mouth is swallowed, and Hunter, in view of his hospital investigations, gives the following possible results: (1) Local affections, stomatitis, periostitis, sinus infections, tonsilitis, and pharyngitis; (2) glandular affections, especially about the neck; (3) gastric and intestinal affections, such as septic gastritis, colitis, and appendicitis; (4) hematogenous infections causing pleurisy, empyema, or nephritis.

(b) *Blind Alveolar Abscess.* This second type, *blind alveolar abscesses,* are not easily diagnosed, and the patient is usually ignorant of their existence. They are readily seen in the radiograph and are of varying size and shape. The pathological examination shows a fibrous granulum, containing the exudates, which are of varying color, odor, and bacterial infection. The staphylococci, pyogenii, streptococci, the diplococcus rheumaticus are some of the more common bacteria present. From these foci toxins are absorbed under pressure and also the pathogenic bacteria escape from the granulum, reaching the systemic circulation through the surrounding lymph spaces or capillaries, and cause, as has been borne out by the recent careful investigations of the most reliable authorities, skin affections, septic endocarditis, arthritis, and nephritis. The etiology of these conditions makes a very interesting

study in itself, but, generally speaking, we can say that the majority of the cases result from infected root canals of the teeth, while a smaller number occur in association with pyorrhea alveoraris and other causes.

TREATMENT OF ALVEOLAR ABSCESSES.

Treatment with medicines. Antiseptics applied into the root canal of a tooth are not always sufficient to sterilize the peridontal granulum.

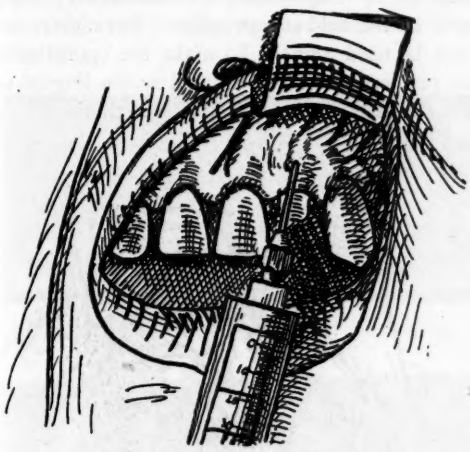


Fig. 8. Apex Amputation of Lateral Incisor, which later will receive a porcelain crown: Labial Injection.

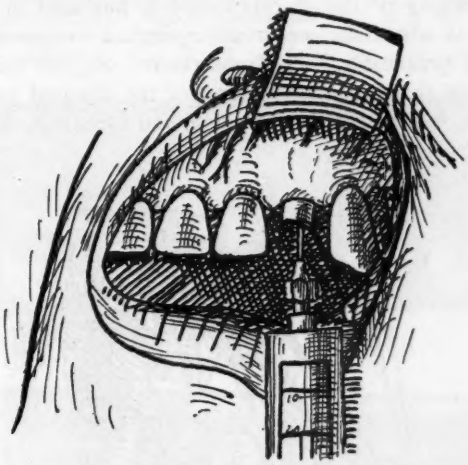


Fig. 9. Apex Amputation: Palatal Injection.

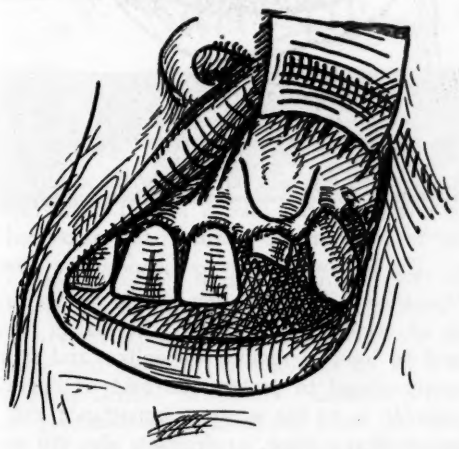


Fig. 10. Apex Amputation: Incisors.

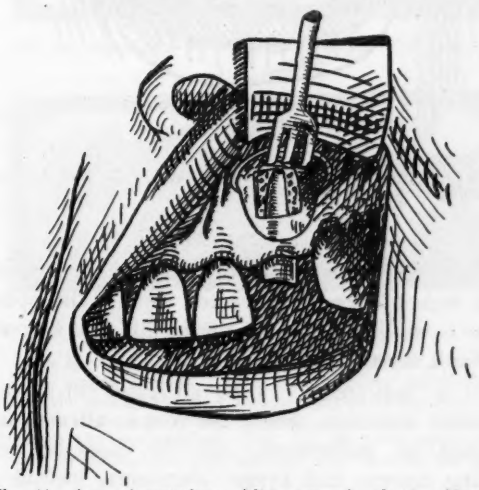


Fig. 11. Apex Amputation: After removal of the Alveolar Process over the distal root.

Ionic medication. Ionic medication is recommended, and is effective in cases where no absorption of the apex of the tooth has taken place, and where the anatomical structure of the root canal allows, after being thoroughly cleaned and enlarged, a perfect root canal filling. This should be inserted so that it hermetically seals the apical foramen of the tooth.

Surgical treatment. From the primitive days of dentistry, where every aching tooth fell a victim to the forceps, we have undoubtedly grown into the other extreme. Even the public has been educated to the fact that every devitalized tooth or root can and should be saved as long as there is no pain and discomfort, and as a result of this conservative dentistry we find to-day that about 25 per cent. of the population suffer from chronic alveolar abscesses.

It is my opinion, that all teeth with chronic alveolar abscesses, whether so-called *blind* or *with sinus,* should be treated surgically, with the exception of cases of short duration, where these can be treated with ionic medication, if the radiograph shows clearly that no absorption of the root has taken place, and where the anatomical structure of the tooth makes an hermetic root canal filling possible, and where the treating and filling of the root canal has been successful.

Surgical treatment is either radical or conservative, and is indicated in all cases, where the abscess is a suspected or established focus of some other systemic or organic disorder. In these cases, it should be made common practice to take a culture, under the necessary precautions, from the apical part of the tooth, both for scientific study, as well as for vaccine treatment, should it be indicated. Extraction of the tooth and thorough curetting of the abscess cavity is indicated in all cases where the conservative surgical treatment is not practicable. The conservative surgical treatment consists in amputation of the diseased root-end, extirpating the granulum, and curetting of the alveolar process.

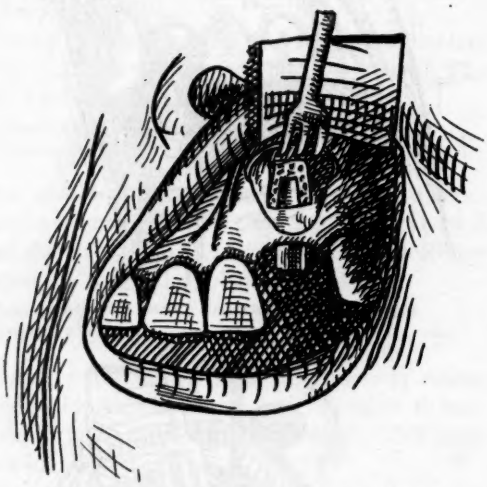


Fig. 12. Apex Amputation: After removal of the Root Apex and curetting of the Abscess Cavity.

ROOT AMPUTATION.

Root amputation can be performed on all teeth, but especially on single-rooted teeth. The operation is easier in front of the mouth, and becomes difficult towards the back.

It is indicated: (1) In all cases of chronic alveolar abscesses, where the root is affected, absorbed, or gangrenous. (2) In cases of well-fitting crowns and bridge abutments, instead of removing the bridges, to treat periapical infections. (3) On roots, which cannot be filled properly on account of obstructions, curving or branching of the root canals, at the apical region. (4) On roots, which have been perforated at the apical part by root canal instruments. (5) To remove instruments broken off in the end of the root canal.

Treatment of the root canal. The root canal should be treated with antiseptics, and can be filled before or during the operation. I prefer to have it filled before the operation. After sterilizing the root canal with iodine, I secure a germ-proof and tight-sealed filling, by the use of a thin mixture of a phosphate cement, with which the canal and gutta-percha point, before inserting, is moistened. It also has to be properly condensed, to adhere closely to the walls of the canal.

Anesthesia. Conductive anesthesia is used combined with the infiltration method, using the high percentage of *Suprarenin* for the latter, to get anemia of the field of operation. But either method can be used alone. To make the operation entirely painless, the labial as well as the lingual side of the alveolar process should be anesthetized (Figs. 8 and 9).

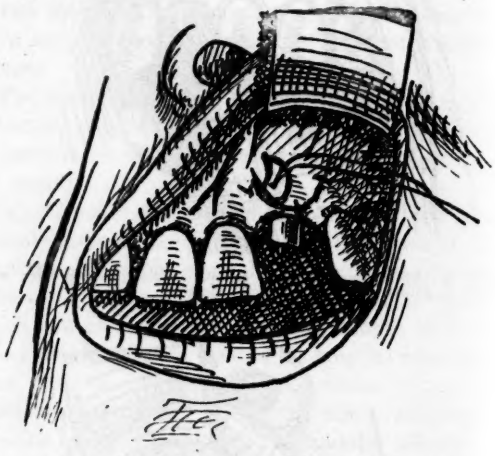


Fig. 13. Apex Amputation: Suturing the wound.

Radiograph. While waiting for the anesthesia to take effect, we can take a second radiograph in order to ascertain the extent of the root canal filling. The first was taken to diagnose the case.

Operation. The operation should be performed with all aseptic precautions. The saliva ejecter should be used to remove the saliva, and sponges properly placed to protect the field of operation. I consider it of the greatest importance that the operator wear a mask, to eliminate also this source of infection of the wound.

Incision. Have the assistant retract the lip, and paint with tincture of iodine. Make a half-round incision through the gum and periostum. Separate the flap from the bone with the sharp periostial, raspatorium. Insert the sharp retractor and have the assistant hold it (Fig. 10).

Amputation of the root apex. The alveolar process is now visible, if it has not been destroyed. A good-sized opening is cut with chisel and burr

to obtain a good view of the apical one-third of the root. Resect the root with a fissure burr at a point not further down than the extent of the root filling, as shown in the radiograph, and far enough to remove all parts which are denuded or gangrenous. Remove the resected root part with a spoon excavator (Fig. 11).

Curetting of the cavity. The most important part is the removal of the granulum and the curetting of the alveolar process with a round burr, or a curette, until healthy bone is visible on all sides (Fig. 12).

Fig. 14. Fig. 15. Fig. 16.

Fig. 17. Fig. 18 (Reversed). Fig. 19.

Fig. 20. Fig. 21. Fig. 22.

Treatment of the wound. Remove carefully all sharp points and smooth the margins. Then wash with normal salt solution to remove all the debris. Sponge and sterilize the whole cavity with iodine one part, alcohol two parts. Stimulate bleeding with a suitable instrument and after the cavity is filled up with a blood clot, draw the flap over the opening and sew it back carefully with horsehair stitches (Fig. 13). The healing occurs by organization of the blood clot. If proper aseptic care has been taken a good union is obtained in a very short time. The stitches are removed after three days, and if horsehair has been used this causes little or no discomfort. In my mind the sewing in the mouth is of the greatest importance. The wound heals by first intention and leaves only a small scar. The packing of the wound with medicated gauze gives chance for new infection, often leaves an ugly scar or depression, and is principally an excuse for, or safeguard against, an operations, which has not been performed under the precautions of modern asepsis.

RADIOGRAPHS OF PRACTICAL CASES.

CASE I. Patient suffered from chronic alveolar abscess with sinus for several years. Antiseptic treatment from the root canal for eight weeks gave no result. Patient was referred to me for amputation and curetting. Fig. 14 shows the peridontal abscess at the ends of the two upper incisors. Fig. 15 shows the teeth after the root canals have been filled. Fig. 16 was taken directly after the operation. Fig. 17, six days after the operation.

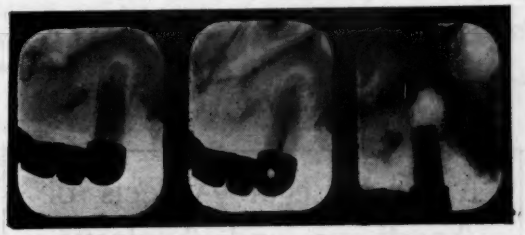


Fig. 23. Fig. 24. Fig. 25.

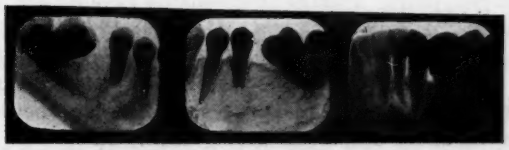


Fig. 26. (Reversed) Fig. 27. Fig. 28.

Fig. 29. Fig. 30.

CASE II. Patient has a chronic blind abscess at the root of the upper incisor. When cleaning the calcified root canal, the end of the root was perforated at the side. Fig. 18 shows abscess condition with instrument extending through the perforation. Fig. 19, the root canal filling emerging through the perforation. Fig. 20, after the operation.

CASE III. Chronic abscess at the root of the upper first bicuspid with sinus. Fig. 21, case before the operation. Fig. 22, case after the operation.

CASE IV. Patient was referred to me for amputation of the apex of the upper cuspid root. This tooth was valuable, as it supported one abutment of a large bridge. Fig. 23, radiograph for diagnosis (note enamel drop under the free part of the bridge). Fig. 24, after root canal filling. Fig. 25, after the operation.

CASE V. Fig. 26, radiograph showing the condition immediately after amputation of the lower bicuspid root (this radiograph was taken on the wrong side of the film). Fig. 27, radiograph showing the condition after two years (note formation of new bone).

CASE VI. Patient was referred to me with the history of a broken root canal instrument in the tooth. Fig. 28 shows the abscess and the broken-off instrument in the apical part of the tooth, distal to the root canal filling. Fig. 29, after amputation of the root apex, which contained the instrument and curetting of the large abscess cavity.

CASE VII. Fig. 30 shows amputation of both roots of a lower molar after the operation.

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Medico-Legal Aspects of Anesthesia and Analgesia.

DAMAGES FOR HOT-WATER BOTTLE BURNS UNDER ANESTHESIA.

A number of decisions, pro and con, have been rendered in respect to damages for hot-water bottle burns under anesthesia during 1914. In

Chilley vs. Bradford,

Victor Chilley, a student of the Royal College of Music, London, was awarded damages of 100 pounds, on account of the negligence of a qualified nurse, acting as the servant of the proprietor of the nursing home, in allowing him to be burned about the legs and feet by a hot-water bottle, while unconscious from an anesthetic, after a nasal operation. The burns were so severe that they necessitated his remaining at Dr. Bradford's some ten weeks. Dr. Bradford himself was found by the jury personally not guilty of any negligence. (*Lancet,* January 31, 1914.)

Reeves vs. Lutz.

In this case the St. Louis, Mo., Court of Appeals held that a verdict for $1,500 damages to a husband for the loss of his wife's services, companionship and society, as a result of a hot-water bottle burn under anesthesia, and permitting the wound to heal over a drainage tube, was not excessive. The burn occurred during the patient's post-anesthetic recovery after an operation for cancer; although the hot-water bottle had been wrapped in a towel, and rested against the patient's leg, which was covered by a flannel operating garment.

The court held that the application of the hot-water bottle for two hours, without investigating its effect, constituted negligence. As there was no evidence in this case justifying the theory of accident, and as the defendant and expert witnesses testified that burns are frequently inflicted in such a manner, then the precepts of ordinary skill and care required the defendant to anticipate this possibility.

Lindler vs. Columbia Hospital.

In deciding the first case in the state on the question: Is a hospital with a charitable foundation liable to patients for injuries caused by the negligence of employees? the Supreme Court of South Carolina affirms a judgment for damages in favor of the plaintiff, who was burned by a hot-water bottle while under the influence of an anesthetic.

While the court admitted that the specific injury in this case might have been due to inadvertence, still it contended that a strong declaration of liability was necessary under the circumstances, to cover the underlying principle involved; absolute immunity from the results of criminal as well as careless negligence, on the part of employees of a hospital which could secure a charitable foundation. Moreover, the court held that, while a trust fund could not legally be diverted to a purpose other than that for which it had been created, under the circumstances, as the charitable foundation called for the relief of suffering, it was only consistent with strict justice for such a fund to repair the evil of its own doing. (*81 S. E. R. 512.*)

Stewart et al. vs. Manasses, Pa..

The plaintiff in this case was non-suited by the Supreme Court of Pennsylvania, on the grounds that a family physician who recommends a patient to a hospital for operation and merely acts as an assistant at the operation, cannot be mulcted of damages for burns from a hot-water bottle while the patient is recovering from the anesthetic, as this negligence was directly traceable to the attending hospital nurse, for whose negligence the attending physician could not be held responsible. (*90 Atl. R. 574.*)

ALLEGED NEGLIGENCE IN ADMINISTERING AN ANESTHETIC TO A SCHOOL CHILD.

In this case of *Davis vs. London County Council,* heard by Mr. Justice Lush, sitting with a common jury on January 27, 1914, an infant scholar at a County Council school, suing by her father as next friend, sought to recover damages for alleged negligence in the administration of an anesthetic;

it being alleged that when the plaintiff was undergoing an operation at the Islington Medical Treatment Center, under control of the defendants, the anesthetist had carelessly allowed some of the A. C. E. mixture to come in contact with her face, with the result that she suffered great pain from the burn thus inflicted and would be permanently disfigured.

The defendants contended that they had entered into an agreement with the Islington practitioners (under the Educational Acts, 1907), whereby the association was to provide premises, while the London County Council was to have administrative control of the work. The Council was also to select an anesthetist and four surgeons from a list of doctors, nominated by the association, and was also to supply one or two nurses to be present as assistants at operations. The Council was to have power to refuse cases, and would contribute to the association's funds an amount determined by the number of half-day's work done by the doctors.

Under such an agreement the court held that the doctors performing the operation or administering the anesthetic were not the servants of the Council, and the jury found a verdict for the defendants. (*British Medical Journal,* February 7, 1914.)

CORONERS' INQUESTS OF DEATHS UNDER ANESTHETICS.

The vexed question of whether it is desirable in the interests of the public that inquests should be held in all cases of death under an anesthetic, was reopened during 1914 by Dr. F. J. Waldo, coroner for Southwark, London, who has contended before that inquests in these cases are beneficial in affording an opportunity, if not for censure, at least for admonition. On representation from Dr. Waldo's court, one of London's largest hospitals, recently overhauled its antiquated system of administering anesthetics, increasing the number of visiting anesthetists and also materially decreasing its previous anesthetic morality.

At the inquest mentioned, Mr. T. I. Brend, an anesthetist to Guy's Hospital, while admitting that the verdict of Dr. Waldo's court had subserved a useful purpose, held that the anesthetist, summoned to give evidence, suffers in many ways. While coroners may possess considerable medical knowledge and forensic acumen, it would be difficult for the best of them to differentiate between deaths, due solely to the use of an anesthetic, and those resulting from depressed vitality or the unavoidable collapse incident to the surgical trauma of the operative procedure. The obvious factor in all deaths on the table is the anesthetic, although the patient may have been given his last chance of life in a hopeless condition.

It is difficult also for an anesthetist in a coroner's court to belittle his responsibility without subjecting the operator to a share in the impending opprobrium. In every coroner's case the anesthetist is practically put on trial for an offence, and his evidence is not infrequently controverted by that of the pathologist, who knows nothing of the clinical aspects of the case. Coroner's inquests were originally intended to ascertain whether a person died as a result of crime, accident or natural causes, and the countless number of successful anesthesias should make the few deaths, which loom so large in the coroner's court, a negligible factor.

Also any effort on the part of the coroner's court to appraise the merits of the technical side of anesthesia, would only result in the expert anesthetist foregoing all hazardous risks, certainly a deplorable outcome. While, undoubtedly, there is improvement in the conduct of anesthesia in the larger hospitals, still the publicity, which classes every death on the table as an anesthetic fatality, simply serves to engender panic in the public mind, regarding a phase of surgery, which is far safer than the risk incurred by the operative procedure itself.

In cases of wanton carelessness in the administration of anesthetics, or in their use for criminal purposes, there is room for prosecutions for manslaughter; but few coroners will be able to make the verdicts of their juries subserve the same useful purpose which Dr. Waldo's have accomplished. Undoubtedly the laws regulating coronial investigation of deaths under anesthesia should be changed or reinterpreted. (*Lancet, January* 31, 1914.)

FEATURES IN THE JULY SUPPLEMENT

The Use of Music During Analgesia:
W. P. BURDICK, M.D., Kane, Pa.

Fifteen Years Experience with Ethyl Chloride as a General Anesthetic:
MARTIN W. WARE, M.D., New York City.

Nitrous Oxid Anesthesia in Labor:
ARTHUR E. GUEDEL, M.D., Indianapolis, Indiana.

Ethyl Chloride as a General Anesthetic for Dental Surgery:
MAURICE GREEN, D.D.S., New York City.

American Journal of Surgery

QUARTERLY SUPPLEMENT of ANESTHESIA and ANALGESIA

Surgery Publishing Co.
J. MacDONALD, Jr., M.D., President and Treasurer
92 WILLIAM STREET - NEW YORK, U. S. A.

Original Articles, Clinical Reports and Experimental Researches on the Theory and Practice of Anesthesia and Analgesia, as well as pertinent Society Transactions, are solicited for exclusive publication in this Supplement.

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F. HOEFFER McMECHAN, A.M., M.D., *Editor*
Cincinnati, Ohio, U.S.A.

Vol I. No. 3. APRIL 1915.

"So God empal'd our Grandsire's (Adam's) lively look,
Through all his bones a deadly chilness strook,
Siel'd up his sparkling eyes with Iron bands,
Led down his feet (almost) to Lethe's sands;
In briefe so numm'd his Soule's and Bodie's sense,
That (without pain) opening his side from thence
He took a rib, which rarely He refin'd,
And thereof made the mother of Mankind."

THE FUTURE OF ANESTHESIA AND ANALGESIA.

¶ THE MEN WHO HAVE ACHIEVED SUCCESS ARE THOSE WHO HAVE WORKED, READ AND THOUGHT MORE THAN WAS ABSOLUTELY NECESSARY, WHO HAVE NOT BEEN CONTENT WITH ABILITY SUFFICIENT FOR THE PRESENT NEED, BUT ALSO HAVE SOUGHT ADDITIONAL KNOWLEDGE AND STORED IT AWAY AS AN EMERGENCY RESERVE. IT IS SUPERFLUOUS LABOR THAT EQUIPS A MAN FOR EVERYTHING THAT COUNTS IN LIFE. (*Davis.*)

Could any editorial text carry a more potent message?

Among Davis' successful men may certainly be numbered those surgeons and anesthetists who have participated in the advancement of the science and practice of anesthesia and analgesia since their inception. While their unselfish efforts have so far resulted in noteworthy progress, there are still many problems to be solved before anesthesia and analgesia will really achieve their predestined birthright.

Such organizations as the American Association, the London, New York, Scottish and Providence Societies of Anesthetists, while they are milestones in the right direction of establishing anesthesia and analgesia as specialties, they do not begin to cover the ground, and State or Interstate Associations, along similar lines and for the same purpose, must shortly follow, if present progress is to be steadily maintained.

Likewise medical schools in America and on the continent must be thoroughly impressed with the necessity of having the science and practice of anesthesia and analgesia taught by experts who have made the study and use of these adjuncts of modern surgery their life work.

Also hospital trustees should be compelled to protect the lives of patients entrusted to their care, by having all general anesthetics administered by or under the supervision of staff- or visiting-anesthetists.

In this connection it is imperative that the Medical Practice Acts of the various States be so amended as to abolish the present menace of the nurse-anesthetist, and that medical associations should question the ethical standing of those surgeons who persist in employing lay-anesthetists, in the presence of competent, licensed practitioners, who are ready to undertake the work and shoulder its full responsibilities.

Again, until medical and dental associations provide facilities for post-graduate work in these specialties, for those who are anxious to perfect themselves in the very latest advances of anesthesia and analgesia, they cannot consistently protest against those commercial concerns that are advertising and providing such opportunities.

In conclusion, it seems needless to reiterate that the journalistic medium which provides surgeons, dentists and anesthetists with a vehicle for the publication of their original researches and an interchange of their latest practices, should be enthusiastically supported, so that its efforts to advance the cause of anesthesia and improve the status of the anesthetist may be an assured success.

F. H. M.

FEATURES IN THE JULY SUPPLEMENT

The First Major Operation Under Ether in England:

F. WILLIAM COCK, M.D., F.S.A., London, England.

(Profusely illustrated with Contemporary Portraits, Scenes, Apparatus and Records.)

PROCEEDINGS OF THE PROVIDENCE (R. I.) SOCIETY OF ANESTHETISTS.

AMERICAN ASSOCIATION OF ANESTHETISTS.

Among the papers announced for the San Francisco meeting of the American Association of Anesthetists, June 19, 1915, are the following: President's address: Nitrous Oxid-Oxygen Anesthesia in Obstetrics, Charles K. Teter, Cleveland, O.; Importance of Raising the General Standards of Anesthesia, Mary V. Madigan, Portland, Oregon; Some Basic Principles of General Anesthesia, Carl G. Parsons, Denver, Colo.; Nitrous Oxid-Oxygen Anesthesia, Mary E. Botsford, San Francisco, Cal.; Ventricular Fibrillation and Chloroform Syncope, E. H. Embley, Melbourne, Australia; Sacral Analgesia in Operations on the Sigmoid and Colon, JeromeT. Lynch, New York City; Blood Pressure Under General Anesthesia, E. I. McKesson, Toledo, O.; Personal Experience with Anoci-Association, Wallace Irving Terry, San Francisco, Cal.; Accidents During and. Following Anesthesia, Isabella C. Herb, Chicago, Ill.; Intravenous Use of Colloidal Gelatin Solutions in Hemorrhagic and Texemic Shock, James J. Hogan, San Francisco, Cal.; Intratracheal Anesthesia (Apparatus), Saxton Temple Pope, San Francisco, Cal.; L. Rockey will also present a new apparatus; The Evolution of Modern Anesthesia, Roland E. Skeel, Cleveland, O. Headquarters and Assembly Room will be in the St. Francis Hotel. A Morning and Afternoon Scientific Session will be followed by a banquet in the evening. For further information address

JAMES T. GWATHMEY, M.D., Secretary,
40 East Forty-First Street, New York City.

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Local Anesthesia in Dentistry. With Special Reference to the Mucous and Conductive Methods. A Guide for Dentists, Surgeons and Students. By Professor Dr. Guido Fischer, Director of the Royal Dental Institute of the University of Marburg. Translated by Dr. Richard H. Riethmüller, of the Dental Department of the Medico-Chirurgical College, Philadelphia. Large octavo, 244 pages, with 115 engravings (mostly colored) and 2 plates. Cloth, $4.00, *net*. LEA & FEBIGER, Publishers, Philadelphia and New York, 1914.

Fischer has achieved the distinction of having almost all other writers on the subject of local anesthesia in dentistry either quote him extensively or base their practice on his fundamental investigations and researches. Braun, Allen and Gwathmey pay him the compliment of being the *authority* on the subject. Those who have been familiar with Fischer's volume since the *First German Edition*, and have appreciated its valuable developments in succeeding editions, will be delighted with Professor Riethmüller's translation, which is really not so much a translation, after all, as a collaboration. Fortuitous circumstances which threw the author and collaborator into intimate association have resulted in an *American Edition* that challenges the excellencies of the original. Fischer's demonstrations before representative American dental institutions and Reithmüller's presentation of his text have established novocain-suprarenin anesthesia as a successful routine practice in dentistry in the United States.

In his revision Riethmüller has spared no pains to condense and revise the text, and to incorporate many changes and improvements based upon the most authoritative knowledge and the best and most practical procedures. The instrumentarium and the technic of making accurate and safe solutions have been improved and simplified, and the methods and points of injection have been even more fully elucidated and illustrated. Special attention has been accorded the subjects of isotonia, asepsis and conductive anesthesia, which latter method has become that of predilection with all skilled operators.

The scope of the work is simply exhaustive. No phase of the subject, historical, physiological, anatomical, or technical, has been slighted. The genius of the author is shown in his ability to teach the science and practice which he has personally mastered, and presenting each detail definitely, frankly and yet with satisfactory completeness.

The foreword on pain is followed by a brief résumé of the historical evolution of analgesia, after which a consideration of the operator's duties occasions some judicious advice regarding anamnesia and eroticism. The physical methods of analgesia are discarded in favor of the chemical with the exception of the stasis bandage. Novocain-suprarenin dissolved in Ringer's solution is the analgesic agent of choice and implicit directions are given for the preparation of various percentage strength solutions. Fischer's instrumentarium is now practically known to every dentist as well as the modified syringe holder and Ringer's flask and instrument tray suggested by Riethmüller. Iodin is preferred for disinfecting the operative field.

In the preparation of the patient the use of such sedatives as bromural or scopolamin are advocated, as are validol, amyl nitrite and camphor in oil for impending collapse. Opiates or trigemin are advised for postoperative pain, in association with tamponing with pure novocain powder.

The indications and contraindications of local anesthesia for various operative procedures are thoroughly discussed, especially in the relation of anesthesia to the therapy of inflammation.

In encompassing the technic of local anesthesia the underlying osteology, neurology and topography are illustrated and explained in minutiae, while the practice of mucous, infiltration, and conductive anesthesia is given in great detail.

The illustrations and color work are superb, and the mechanical features of the book are all that could be desired.

The present edition stands as the authoritative reference volume on the subject, and the SUPPLEMENT compliments itself on the fact that both Dr. Fischer and Professor Riethmüller are now on its staff of Associates, and its readers will, in the future, be given all the advances in local anesthesia for dentistry from these authorities at first hand.

Proceedings of the Royal Society of Medicine: Section of Anesthetics. Vol. vii; Comprising the Report of the Proceedings for the Session 1913-1914. LONGMANS, GREEN & Co., London, 1914.

This volume is of especial interest because it reflects the impression formed on the Continent regarding two American innovations in anesthesia—anoci-association and intratracheal insufflation. Considering the conclusions of Chaldecot and Bryan, it is apparent that anoci-association methods of anesthesia and operating will be *de rigeur* in England henceforth.

The Review of Inquests Concerning Deaths During Anesthesia, 1910-1913, submitted by Flemming for the action of the Section on Anesthetics, has already been dealt with in the OCTOBER SUPPLEMENT; but it is well worth critical analysis by those who are interested in the question of anesthetic fatalities.

The exposition of intratracheal anesthesia by Kelly, Boyle, Shipway and Pembrey, is exhaustive and timely.

The Discussion of Posture in Relation to General Anesthesia, opened by McCardie and participated in by Blumfeld, Hewitt, Waggett, Harmer, de Prenderville, Barwell, Davis, Boyle and Tilley, is perhaps the most noteworthy contribution on the subject in the annals of anesthesia;

and while readers are already familiar with an abstract of the discussion, the full report is sufficiently important to be valuable as a reference. McCardie's main contentions have been recently corroborated by means of radiographs in the experiments of Scholz.

Goodman Levy's much-quoted and discussed paper on Sudden Death under Light Chloroform Anesthesia from Fibrillation, concludes one of the most interesting volumes of the Section of Anesthetics, issued since its inception.

Oral Anesthesia: Technic and Practical Application of Local Anesthesia of the Oral Cavity in the Different Branches of Dentistry. By KURT HERMANN THOMA, D.M.D., Assistant in Anesthesia and Dental Anatomy, Harvard Dental School, Harvard University. *First edition.* Cloth, 142 pp., 91 illustrations, some in color. RITTER & FLEBBE, Boston, Mass., 1914.

According to Thoma, in these days of nervousness, hysteria and competition, the dentist can accomplish his work with the least discomfort to the patient, in the shortest time and with the most perfect results under the influence of local anesthesia. Hence the *raison d'etre* for his volume on Oral Anesthesia.

Thoma begins his book with a concise but thorough exposition of the anatomy of the oral cavity, its osteology, neurology and topography. This portion of the text is profusely illuminated with graphic illustrations, many in color, all serving the specific purpose of preparing the tyro for oral anesthesia on a basis of anatomical accuracy.

In the section on pharmacology he elaborates on the unique value of novocain and synthetic suprarenin, preferably dissolved in Ringer's solution made from freshly distilled water. In this connection Thoma reiterates some excellent advice about the cautious use of suprarenin. His instrumentarium is essentially that of Fischer. His instructions regarding the preparation of the solutions for injection are given with painstaking detail, and, in no small measure, account for the routine successful results of his methods.

Pursuing the subject he discusses in their every phase the technics of surface, infiltration, conductive and ganglion anesthesia, illustrating his technic in a most novel manner by showing the position of the needle in its relation to the bony, neural and dental structures by means of radiographs. This innovation in illustrating is perhaps the most valuable feature of Thoma's book.

Due consideration is given to the various causes of analgesic failures and to the management of complicating ill-effects of oral anesthesia. In conclusion, Thoma makes the practical application of his advocated technic to the many exigencies of operative dentistry, crown and bridge work, exodontia and oral surgery.

The volume stands as an excellent working manual for not only the progressive dentist, but also for the general surgeon who is interested in oral anesthesia.

Practical Anesthetics with Nitrous Oxid and Oxygen. By Edward S. Barber, D.D.S. Cloth, Octavo. *First Edition.* 305 pp.; 87 illustrations, some in color; thumb-indexed. NATIONAL DENTAL PUBLISHERS, Chicago, 1914.

Barber dedicates his book to those whom he has instructed, and his volume bears evidence that he has mastered his subject, not only by personal research and clinical experience, but also by teaching it. His title is well chosen because his special technics of nitrous oxid-oxygen analgesia and anesthesia are the result of individual development.

In his description of apparatus Barber limits himself to a consideration of the Clark device, as with it he has achieved his own success. His details regarding its use are exhaustive and eminently practical; so much so, in fact, that even the tyro in anesthesia and analgesia should be able to profit by them. In this connection, also, he explains the advantages of certain mechanical improvements in gas-oxygen apparatus, such as pressure reducing control of the gases, centrifugal mixing of the nitrous oxid and oxygen, warming of the vapor, associated etherization and the technical details of oral and nasal administration.

His chapter on the Preparation of the Patient, in which he considers especially the anesthetic risks involved in the presence of certain complications, such as billiousness, coryza, bronchitis, or pneumonia, intoxication, fear, exopthalmic goitre, circulatory disturbances, and a previous bad anesthetic history, is filled with valuable advice with regard to handling these hazards with safety.

Special attention is given to the position of the patient in the chair to facilitate the dentist's work as well as to prevent inconvenient movements. The jiu-jitsu tricks for controlling obstreperous patients are not only harmless, but effective, and should really be practiced so that the dentist can use them instantaneously in meeting any emergency.

The latest methods of resuscitation are discussed and attention drawn to the use of carbon dioxid in association with oxygen perflation to combat the condition. Also the discriminate use of stimulants and sedatives is advocated.

In his chapters devoted to Analgesia and Anesthesia proper, Barber dilates not only on the technic of administration, but also fully explains the use of the accessory instrumentarium, which is a valuable feature. The Teamwork between Operator and Assistant is given due consideration, as are also those esthetic factors which make the taking of an anesthetic pleasant and recovery therefrom without untoward incident.

As a whole Barber's book is a satisfactory working manual and is as *practical* as the title infers.

Society Proceedings.

Membership in a society devoted to your specialty is an essential to success.

INTERSTATE ASSOCIATION OF ANESTHETISTS.

The Interstate Association of Anesthetists will hold its organization meeting, in conjunction with the Ohio State Medical Association in Cincinnati, O., May 4-5, 1915, at which time the following elaborate scientific program, devoted exclusively to recent advances in anesthesia and analgesia, will be presented:

Foreword, Dr. Robert Carothers, Ohio State Medical Association Councillor; Selection of the Anesthetic, Emmett F. Horine, Louisville, Ky.; Nitrous Oxid-Oxygen Anesthesia in Obstetrics, Arthur E. Guedel, Indianapolis, Ind.; Blood-Pressure under General Anesthesia, E. I. McKesson, Toledo, O.; Conductive Analgesia for Intra-oral Operations, Hugh MacMillan, Cincinnati, O.; Alkaloidal Medication in Relation to Anesthesia and Analgesia, Isabella C. Herb, Chicago, Ills.; Anesthesia for Brain Surgery, Charles K. Teter, Cleveland, O.; Use of Music During Anesthesia and Analgesia, W. P. Burdick, Kane, Pa.; Magnesium Sulphate Narcosis, D. D. DeNeen, Cincinnati, O.; Ethyl Chloride Anesthesia, R. A. Rice, Columbus, O.; Intravenous Anesthesia, C. L. Candler, Detroit, Mich.; Preparatory, Operative and Postoperative Precautions for Hazardous Genito-Urinary Risks, Moses Salzer, Cincinnati, O.; Vapor Anesthesia for Intraoral Surgery, Paul R. Coble, Indianapolis, Ind.; Local Anesthesia for Hernia Operations, Charles T. Souther, Cincinnati, O.; Surgical Mortality from the Standpoint of the Anesthetist, H. W. Kearney, Washington, D. C.; Nitrous Oxid-Oxygen Analgesia in Dentistrv. Edward S. Barber, Chicago, Ill.; Posture and Muscular Relaxation as Factors in the Newer Conception of Shock, Willis D. Gatch, Indianapolis, Ind.; Spinal Anesthesia, John Overton, Tulsa, Okla.; Acapnia, E. M. Sanders, Nashville, Tenn.; Anesthesia—a Full-Fledged Specialty, W. Hamilton Long, Louisville, Ky.; Anesthesia, Anesthetists and Workmen's Compensation Laws, F. H. McMechan, Cincinnati, O.; Intratracheal Insufflation Anesthesia, B. Merrill Ricketts, Cincinnati, O., with Demonstration of a Portable Field-Apparatus by Major Allie Williams, U. S. A., Washington, D. C.

Headquarters, Assembly Room and Exhibits will be in the New Hotel Gibson, in which all the Sections of the Ohio State Medical Association will also meet. An in-

formal organization dinner will be served on the evening of May 4, and later the visiting anesthetists will be the guests at a Smoker of the Local Committee headed by Dr. E. O. Smith. Visiting ladies will be entertained by Dr. Nora Crotty and her committee at a reception and theater party.

Anesthetists, surgical and dental, as well as interested surgeons and general practitioners, are cordially invited to attend. For further information and dinner reservations address

F. H. McMECHAN, M.D., Sec'y.,
1044 Wesley Ave., Cincinnati, O.

SCOTTISH SOCIETY OF ANESTHETISTS.

The first meeting of the Society was held in Edinburgh on the 18th of April.

The President, Dr. C. A. McAllum, in the Chair.

After the transaction of private business, including the final drafting of the Rules, the President read his introductory address entitled: "False Anesthesia." In the course of his remarks he defined this condition as differing from true anesthesia in that if the patient suffers any trauma, such as an incision with the knife, he at once exhibits active reflexes, moves or cries out, although his appearance has been that of true anesthesia. The condition is met with either during the induction period or during the course of operation—very rarely after the administration has stopped. The chief signs during induction are as follows: shallow respiration, cyanosis, flaccid muscles, absence of corneal reflex, contraction of the pupil, staring appearance of the eye, and a free secretion of thin saliva. If the condition arises during the operation the signs are similar, save that the pupil is dilated—the appearance thus closely corresponding to the condition of overdosage. Both forms occur much more commonly with chloroform than with any other anesthetic.

As to its causation he believed that since it arose mostly in the hands of those who encouraged the patient to breathe very deeply during the induction stage, that the condition was largely one of apnoea. He also considered that in some cases the respiratory mucous membrane and cornea itself were in a condition of partial local anesthesia. The diagnosis was at once important and difficult, for there were risks of reflex shock if the patient was incised while in this condition, which yet so closely resembled true anesthesia. He considered that the method of taking the corneal reflex was a prime factor in making the distinction. The usual method of lifting and fixing the upper lid with one finger, while touching the cornea with another finger, at the same time observing whether the lower lid twitched, was a very rough one. A far more delicate test was the brushing of the center of the cornea, and observing whether the upper lid closed down upon the eye. Taken in this way the corneal reflex would usually distinguish between the two conditions.

With a view to guarding against false anesthesia he strongly deprecated the encouragement of exaggerated breathing on the part of the patient in the very early stages, while during the close of the induction period he stimulated both the lips and the front of the chest with a view to encouraging deeper and fuller respiration.

ABSTRACT OF THE DISCUSSION.

Dr. Paton Boyd did not commonly see the condition. He agreed with Dr. McAllum that the ordinary method of taking the corneal reflex was faulty.

Dr. Torrance Thomson (Edinburgh) also practically never encountered the condition, as he hardly ever used chloroform.

Dr. Lamb (Victoria Infirmary, Glasgow) hardly thought that the title which the President had chosen for his paper quite accurately indicated the condition which he described; and which seemed to be rather an apparent but not real state of dangerously deep anesthesia. In the past he had looked upon "False Anesthesia" as exemplified by the condition, met with most frequently in children, in which all the ordinary signs of a moderate anesthesia were present—regular respiration, absence of corneal reflex, contracted pupil, flaccidity, etc.—but in which the slightest operative interference or even the forcible pinching of the skin at once elicited movement or phonation, and in fact woke up the patient. The term "False Anesthesia," as applied to this condition, might be otherwise described as "Anesthesia Sleep." The condition described by the President could be ascribed to a too light anesthesia and the apparently dangerous signs to the depression resulting from impending sickness, Dr. McAllum having mentioned sickness as a frequent and immediate sequel to the condition. In the past Lamb had looked upon it as the cause of the condition, but he would take every opportunity of observing future cases from this other point of view.

Dr. J. Johnston (Aberdeen) agreed that the condition was a clinical entity. He, however, believed with Dr. Lamb that some cases, which, according to the essayist, would fall under the class of "False Anesthesia," were really cases of impending vomiting.

Dr. Arthur Mills (Dundee) was particularly interested in two points which Dr. McAllum emphasized, namely: (a) the relative frequency of the occurrence of this condition when the patient had breathed in a forcible manner early in the induction period, and (b) the fact that while in this state of spurious anesthesia the patient frequently secreted an abundant flow of clear saliva. So far, he had only observed the latter phenomenon in children and had then found it to be a frequent precursor to laryngeal crowing once true anesthesia had been obtained. He was so convinced of the frequency of the condition that he invariably discouraged, in adults, unnatural forcible respiration at the commencement of the administration. He had only observed the condition of false anesthesia during the induction period. The condition which Dr. McAllum described as occurring during the course of the operation was difficult of differentiation from a state of too light anesthesia with impending vomiting, and naturally was frequently observed after the administration is stopped. As regards causation, Mills was inclined to attribute the phenomenon to a dilation of the splanchnic area and consequent cerebral anemia. Culminating often in vomiting, this act itself mechanically remedied matters, emptying the abdominal vessels and flooding the brain with blood. In testing the corneal reflex he found the lower lid movement of great value, especially when the reflex was nearly gone. His impression was that slight lateral movement of the lower lid toward the nose can frequently be elicited after the upper lid has apparently ceased to respond.

Dr. Fairlie (Glasgow) questioned the theory of the local anesthetic action of chloroform on the respiratory mucous membrane in the production of false anesthesia. In his experience the condition, although common in children, was not common in infants under two years of age, the very class of cases in which a local anesthetic action would be expected. False anesthesia seemed to him to occur more frequently as a sequel to fear or nervousness during the induction of anesthesia.

Dr. Ross (Edinburgh) saw the condition rarely, as he used ether so much more commonly than chloroform, but he agreed that it did exist, and that it was difficult to diagnose. The method of taking the corneal reflex described by the President was first brought to Dr. Ross's notice by the writing of Bellamy Gardner, and he believed it to be the only proper one. He considered that weak percentages of chloroform were a likely cause of the condition. The condition of the pupil was a very striking one and did not resemble that of any proper degree of chloroform anesthesia. It suggested to him some unusual degree of the internal secretion of adrenalin.

Dr. McAllum replied briefly, maintaining that the condition, when arising during operation, was different from that of merely impending vomiting, but he considered that vomiting was a common sequel of the condition and usually terminated it.

INHALATION METHODS OF ETHERIZATION APART FROM INTRATRACHEAL INSUFFLATION.

In the discussion of this subject, Dr. Paton Boyd spoke of his own methods. He always had given to the patient the previous night a dose of veronal and half an hour before the operation a hypodermic of sulphate of atropin. He objected to the use of morphia. He began with the

Ormsby Inhaler, which he had used for many years, and which no one had been able to convince him was really antiquated. He remembered Dr. Carter Braine remarking to him that it was a big man whom you could not overcome with a bottle of ether and a bath sponge. He used the sponge dry and on it placed first of all 5 c.c. of ethyl chloride. At the end of a minute the patient was well under and he then added ether to the sponge. The patient should be well under in five minutes, and after another few minutes he was usually able to discard the closed inhaler and turn to the open method. He never found it necessary to prop open the mouth nor to use a tongue forceps save in emergencies. He did not consider that the induction by the closed method seriously increased the after vomiting, though he admitted that the use of ethyl chloride did occasionally lead to some trouble in this respect. As regards the scope of ether he thought it met the great bulk of cases, but he had not gone the length of entirely discarding chloroform from his practice, believing that young children, elderly or stout persons, usually took it better than ether.

DR. J. H. GIBBS (Edinburgh) held that the irritating properties and unpleasant smell of strong vapors of ether made it undesirable to induce anesthesia with it, and it was consequently very important to discuss how best to guide the patient through the first stages of anesthesia, particularly in view of what should be taught to students.

The ideal method would be one that quickly and safely rendered the patient unconscious and that did so with absolutely no unpleasant sensations, so that the patient could say afterwards, "I just went to sleep."

The desiderata of speed and safety were very satisfactorily found in nitrous oxid and in ethyl chloride; but the factor of the patient's comfort depended very much upon the administrator, whatever drug was chosen.

During the last few years, in particular, it has become the custom to inject atropin with or without some narcotic, prior to inducing anesthesia. In Gibbs' opinion, this should be done in all cases of general anesthesia that are to last more than a few minutes, and even in some cases of "single dose" anesthesia, no matter what anesthetic was used. He did not know of any class of cases where atropin, in a suitable dose, was inadmissible. With regard to narcotics such as morphia, there were circumstances where its use was contra-indicated, but although he preferred to use it, it was not by any means so essential as atropin.

Dr. Gibbs also referred to the use of the terms "open" and "closed" ether, which he thought essentially bad, because misleading. These terms have led to the assumption that an anesthetist who used an inhaler with a bag was necessarily making use of a closed method and was more or less asphyxiating his patient, and that the man who uses a mask with gauze was using an "open" and therefore "non-asphyxiating" method, no matter how much the patient might be smothered up with lint, wool, or towels. The truth of the matter was that "open" ether anesthesia did not exist, and that it was just as easy to give ether with an inhaler and bag, provided a large bore apparatus was chosen, and as satisfactory in every respect as to give it with a mask. In every case a certain minimum percentage of ether vapor must be presented to the patient in order to allow sufficient ether to circulate in the blood for the induction and maintenance of anesthesia. Now, the minimal dose should also be the maximal one, and really the only objection to a "closed" apparatus was the ease and safety with which the minimal dose might be exceeded, and the ease with which air deprivation might take place. This, however, was not the fault of the large-bore apparatus, but of the anesthetist, in not using it properly.

Passing on to the question of induction, while ether was very unsuitable owing to its unpleasantness, it was eminently safe. In the choice of any drug, the fact must be taken into account that there are some people who object to the application of a facepiece. They are, however, a very small number, and there are very few indeed who cannot be persuaded to allow a facepiece to be used by a few minutes kindly explanation and the promise that it shall be allowed merely to touch the face without resting upon it. If persuasion is of no avail, anesthesia is started with chloroform, and before the patient loses consciousness, increasing quantities of ether are added until a mixture of two parts of chloroform and three parts of ether is reached to carry the patient well into the second stage. The mask and mixture are then discarded for a large bore inhaler, such as Hewitt's. In this way chloroform is discarded at a period prior to that at which any danger can arise from it.

In the vast majority of cases, however, the best routine practice is to induce anesthesia with nitrous oxid or chlorid of ethyl. For the average adult probably nitrous oxid is the better, but as a matter of fact, owing to the difficulty of carrying it about, ethyl chlorid is most available. Ethyl chlorid, if properly administered, while possibly not quite so safe, is no more unpleasant to take than nitrous oxid, and shares with that drug, though in far greater degree, the advantage of rapid induction. In considering the best means of induction, rapidity combined with safety is a very important factor, because it not only curtails the period of greatest distress to the patient, but in busy hospital practice it saves much valuable time. The maximum dose necessary is 3 c.c., and for children and fragile patients about half that quantity. The ethyl chloride is put into a graduated glass tube which is connected to the apparatus by a piece of red rubber tubing which slips on to a metal tube with a universal joint on the bag-mount.

In use, the face-piece is lightly applied to the face of the patient with one hand, and while talking encouragingly to him, a cup, half full of nearly boiling water, is brought for a moment just in contact with the bottom of the tube of ethyl chlorid. When the gentle boiling of the ethyl chlorid is passing off, the hot water is again applied until in ten or fifteen seconds the patient is so muddled as not to object to the remainder of the ethyl chlorid being rapidly evaporated by a continuous application of the hot water. The object in view is to present the strongest vapor the patient will accept without showing any sign of discomfort. Should the patient show any such sign, the hot water is withheld until what has been already vaporized has had time to deepen the degree of analgesia already obtained, and it is then again cautiously applied to the tube. After all the ethyl chlorid has been evaporated, the patient is allowed to continue breathing it for three or four respirations before the ether is turned on. Here, too, the anesthetist can save himself trouble and shorten the period of induction by attention to details. In many cases the reflexes of the patient are still more or less active, and he must be carried on into full ether anesthesia without arousing inconvenient ones. This can be readily done by presenting a very weak vapor during inspiration and a much stronger one during expiration. To do this, the patient's respirations are observed and the pointer is turned nearly half way during expiration, and back to *nought* for the succeeding inspiration. After a few such respirations the pointer can be advanced to *three-quarters* for expiration and to *one-quarter* for inspiration, then to *full* for expiration and to *half* for inspiration. At this stage the patient is sufficiently anesthetized to allow the pointer to be slowly moved on from *half* to *full,* irrespective of inspiration or expiration, and the anesthetist must then determine by the usual signs whether the patient is ready for the surgeon to begin operating.

Induction by means of nitrous oxid is carried out much in the same way. Greater care, however, should be taken to be sure that the patient is unconscious before the ether is admitted. From the time that ether is turned on, no more nitrous oxid or nitrous oxid and oxygen, as the case may be, should be given, as the object is gradually to saturate the gaseous contents of the bag with ether vapor. When the patient is nearly anesthetized, the nitrous oxid may be squeezed out of the bag and the patient allowed to replace it with air, by the anesthetist lifting the facepiece during an inspiration and applying it during expiration.

DR. ROSS considered the difference in result between a closed and an open method, as caused not so much by the rebreathing of the closed method, but by the fact that most inhalers do present some obstruction to the flow of the respiratory current. Hewitt's wide bore inhaler was introduced with a view of minimizing this objection. Applied upon one's own face without putting ether into the

chamber, so long as the indicator is at o there is no perceptible check, but as soon as it is moved over, a distinct obstruction to respiration can be felt. Obviously the obstruction in the Ormsby Inhaler is less than in any other closed apparatus, and it is worthy of trial in certain cases where the open method does not give a sufficient deep anesthesia. Dr. Ross always used a small dose of morphia with the atropin. He maintained that it was just as bad to use none as it is to use large doses. As regards pleasant induction, Ross has tried all methods. The open ethyl chlorid—ether sequence described by Hornibrook—gave very good results, but sometimes led to serious after vomiting. In many cases, and in particular, of women, open drop ether induction was quite possible, and was as pleasant to the patient as any other method. But in strong men chloroform in some form was usually indicated. Personally, Ross used it in the form of C_2 E_8 to carry the patient to the degree of light anesthesia. After that, anesthesia was continued by drop ether entirely, using practically the methods of Bellamy Gardner, with the addition of a towel folded up to form a hood in front of the mask. This was frankly copied from the Ferguson inhaler, with which he had not, for some reason, had entire success. The mouth prop was usually essential towards securing free respiration and really good muscular relaxation, but it seemed barbarous habitually to clip every tongue according to Bellamy Gardner's routine. Ross has never succeeded in bringing his quantities of ether per hour down to the low level indicated by American anesthetists. Six to seven ounces during the first hour, including the induction, was his average, with three or four for the second hour.

Dr. Torrence Thomson always used the open method, given by his own inhaler, which had been elsewhere described. The large dose of morphia or morphia and scopolamine which he formerly favored he did not now use. Small doses of morphia with atropin gave better results. The great bulk of all cases could be dealt with by open ether, and even in the induction stage chloroform was rarely necessary. He had entirely abandoned closed inhalers. He agreed with Dr. Ross that the quantities of ether necessary to secure an anesthesia deep enough for the views of the British surgeon were much greater than those published by American anesthetists. He did not think that this increased in any way the after suffering of the patient. He never clipped the tongue forward, but he sometimes left in a Doyen's gag, packing the shank round with gauze to prevent leakage of ether vapor.

Dr. David Lamb (Glasgow) was of the opinion that when time was no object the administration of ether by the *open method* was the most pleasant and the most satisfactory, both during and after the administration.

When time had to be considered, ether given by a Clover apparatus, either alone or preceded by nitrous oxid or chlorid of ethyl was of course quite satisfactory, but he thought that a more gradual induction of anesthesia gave the best results in abdominal work.

His practice in such cases had been influenced by the fact that when he first used ether he had to fight against a very strong prejudice on the part of the surgeons in favor of the *quiet* anesthesia of chloroform. Ether mixed with chloroform, C_2, E_8, in most cases fulfilled the requirements of the patient, the surgeon and the anesthetist, though now with the further developments in abdominal work, the mixture should be given until the stage of excitement was past, then chloroform, until deep anesthesia was obtained; thereafter, *open* ether or chloroform according to the requirements of the case.

Physiologists state that the administration of ether *sensitizes* the heart muscle and that the subsequent administration of chloroform is dangerous. Clinically Lamb has found that ether always stimulates the heart and that if chloroform is given subsequently with reasonable care, allowance being made for the more rapid respiration and the consequent more rapid intake of the drug, there was less danger than when ether had not been used.

When administering chloroform Lamb always felt more comfortable when the heart had previously been, as it were, *primed* with ether, either alone or in mixture.

Dr. Johnston (Aberdeen) objected to the use of morphia, save in selected cases. He generally used chloroform as the inducing agent, but found open ether very satisfactory for the bulk of cases after the induction period.

Dr. A. Mills used an inhaler somewhat resembling the Ferguson instrument, with which he found many cases required no chloroform at all, though many did.

Dr. Howard Jones (Edinburgh) protested against the term *open* ether when small admixtures, even as low as one in ten of chloroform, were being used.

Dr. Gibbs in his reply said he did not believe there was any such thing as *open* ether. In his judgment the Hewitt instrument caused no obstruction in respiration and the results, both immediate and remote, were all that could be desired.

John Stuart Ross, M.D., Hon. Sec'y.

AMERICAN ASSOCIATION OF ANESTHETISTS.

The Second Annual Meeting of the American Association of Anesthetists was held at the Hotel Chelsea, Atlantic City, June 22, 1914. President James T. Gwathmey called the meeting to order, and after a reading of the minutes of the 1913 meeting at Minneapolis, the following officers were elected for the ensuing year:

President, Dr. Charles K. Teter, Cleveland, O.; Vice-Presidents, Dr. Willis D. Gatch, Indianapolis, Ind.; Dr. T. Drysdale Buchannan, New York Citv and Dr. Mary V. Madigan, Portland, Oregon; Secretary-Treasurer, Dr. James T. Gwathmey, New York City; Executive Committee, Dr. F. W. Pinneo, Newark, N. J., and Dr. W. C. Woolsey, New York Citv.

A number of candidates were then elected to membership.

A communication from Dr. F. H. McMechan, Cincinnati, O., outlining in detail a prospective Supplement of Anesthesia and Analgesia, to be incorporated in the American Journal of Surgery, was read, and after a discussion by Dr. A. H. Miller, Providence, R. I., and Dr. James T. Gwathmey, the Association voted to adopt the Supplement as the official organ for the publication of its transactions.

During the two scientific sessions that followed, papers were read by Dr. F. W. Pike, Columbia University, New York City; Dr. H. Warren Buckler, Baltimore, Md.; Dr. F. W. Nagle, Montreal, Canada; Dr. James F. Mitchell, Washington, D. C.; Prof. Charles Lieb, Columbia University, New York City; Dr. George W. Crile, Cleveland, O.; Dr. Karl Connell, New York City; Dr. James T. Gwathmey, New York City, and Dr. Wayne Babcock, Philadelphia, Pa.

There was a liberal attendance of anesthetists from all parts of the United States and Canada, and quite a complement of interested surgeons and physiologists.

The meeting was concluded with a banquet at the Hotel Chelsea in the evening.

The next meeting of the Association will be held in San Francisco during the Panama-Pacific Exposition, at a date just prior to that of the American Medical Association, June 19.

Index and Abstracts

A Résumé of the International Current Literature of Anesthesia and Analgesia.

EDITOR'S NOTE: Authors of pertinent articles, who desire to have them indexed and abstracted, are cordially invited to send copies of the journals containing their contributions, direct to the editor, immediately on publication. Also the receipt of reprints for filing and reference will be duly appreciated.

Anesthesia. J. Blumfield, London, Practitioner, November, 1914.

Anesthesia, Practical. W. N. Lynn, Knoxville, Tennessee State Medical Journal, November, 1914.

Anesthesia, Suggested, Removal of a Sebaceous Cyst, Under. J. W. A. Cooper, Lancet, January 23, 1915.

ANESTHESIA CHART, SUGGESTION OF CLOCK DIALS ON. F. St. Clair Reilly, Havre, Mont., Journal of the American Medical Association, January 16, 1914.

ANESTHESIA IN GYNECOLOGY. H. Schlimpert. Archiv fur Gynaekologie, CIII, Nos. 1, 2, 3.

ANESTHETICS. (Ueber Schmerzstillende Mittel.) M. Kochman, Therapeutische Monatschefte, October, 1914.

ANESTHETICS, SELECTION OF, SEQUENCES AND METHODS. F. W. Nagle, Montreal, Canadian Medical Journal, December, 1914.

ANOCI-ASSOCIATION IN STOMACH AND GALL TRACT SURGERY. George W. Crile, Cleveland, O., Lancet-Clinic, February 27, 1915.

ANOCI-ASSOCIATION ANESTHESIA AND SHOCK. A. M. Fauntleroy, U. S. Naval Medical Journal, January, 1915.

ANOCI-ASSOCIATION. C. A. Pannet, British Journal of Surgery, October 11, 1914.

ANTINOCI-ASSOCIATION. N. Rosenwasser, Cleveland, O., Lancet-Clinic, January 30, 1915.

APPARATUS—A PORTABLE POSITIVE-PRESSURE APPARATUS FOR THE ADMINISTRATION OF ETHER BY INTRATRACHEAL INSUFFLATION. Allie W. Williams, U. S. A., Washington, D. C., Journal of the American Medical Association, January 9, 1915.

APPARATUS—FIELD AND HOSPITAL APPARATUS FOR LOCAL ANALGESIA ON A LARGE SCALE. P. Kuhn, Deutsche Medicinische Wochenschrifft, October 22, 1914.

APPARATUS—A NEW APPARATUS FOR NITROUS OXID-OXYGEN ANESTHESIA. Albert H. Miller, Providence, R. I., Journal of the American Medical Association, October 24, 1914.

BLOOD, ACIDITY OF, INFLUENCE OF INHALATION ANESTHESIA ON, AS DETERMINED BY THE H-ION CONCENTRATION. George W. Crile, Cleveland, O., Annals of Surgery, January, 1915.

BRACHIAL PLEXUS, BLOCKING OF, 110 CASES. H. Boit, Beiträge zur Klinische Chirurgie, XCIII, No. 2.

CHLOROFORM ANESTHESIA. J. Stewart, Halifax, N. S., Canadian Medical Journal, December, 1914.

CHLOROFORM POISONING, CASE OF DELAYED. H. P. Fairlie, Lancet, December 19, 1914.

CHLOROFORM POISONING, LATE, RESISTANCE OF PUPS TO, IN ITS RELATION TO LIVER GLYCOGEN. E. A. Graham, Chicago, Ill., Journal of Experimental Medicine, February, 1915.

CONDUCTIVE ANESTHESIA. J. E. Nyman, Dental Register, November, 1914.

CONDUCTIVE ANESTHESIA, THE TECHNIC OF. Theodor Blum, New York, The Dental Summary, February, 1915.

DEATHS—FACTORS DETERMINING MORBIDITY IN SURGICAL CASES. C. W. Moots, Toledo, O., American Journal of Obstetrics, November, 1914.

DEATHS—SYNCOPE AND FATAL ASPHYXIA UNDER NITROUS OXID-OXYGEN ANESTHESIA. H. C. Luke, New York Medical Journal, January 30.

DENTAL ANESTHESIA, EDINBURGH SYSTEM OF. J. Stuart Ross, British Dental Journal, May, 1914.

DENTAL PRACTICE, NITROUS OXID ANALGESIA IN GENERAL. E. B. Prentiss, New York. Dental Cosmos, February, 1915.

Dentistry, Operative, Anesthesia and Its Relation to. W D. DELONG, Reading, Pa., *The Dental Cosmos*, February, 1915.

In presenting this subject to the Pennsylvania State Dental Society, DeLong found, after a canvass of 200 dental offices, that 37 per cent. were equipped with the latest models of nitrous oxid-oxygen outfits, an indication that dentists were taking a renewed interest in the use of anesthesia and analgesia for operative dentistry. In this connection DeLong was of the opinion that while the ingenuity of dentists and manufacturers would solve the various problems involved in perfecting the anesthetic apparatus, still it must not be forgotten that no mechanical device could ever replace the sight, hearing, analysis, judgment, decision and skill of the accomplished anesthetist. Irrespective of apparatus, *skill* is the paramount requisite for success in the conduct of anesthesia and analgesia. The use of nitrous oxid-oxygen also enabled the dentist, by relieving his patients of pain, to do better operative work in a much shorter space of time. DeLong also pleaded for more instruction in the present methods of conducting anesthesia and analgesia, and rather deplored the fact that much of this instruction filtered through the channels of the dental supply houses.

In discussing this phase of the subject, Reithmüller, of Philadelphia, was vexed that all the iniquities of dentistry were habitually charged against the dental schools and manufacturers. In his opinion, dental schools gave careful courses in anesthesia and analgesia, and there were also opportunities for special courses and post-graduate work. He hoped that the action of the Academy of Stomatology of Philadelphia along these lines would be followed all over the country by State and local dental organizations, and until such societies instituted courses in anesthesia and analgesia, they could not consistently slur the efforts of commercial houses in meeting this demand of their patrons, particularly when the instruction provided by them was in the hands of experts holding diplomas from the most reputable dental colleges.

ETHER, ITS INFLAMMABILITY AND EXPLODABILITY; ITS ADMINISTRATION AND EFFECTS ON LUNGS AND KIDNEYS. L. F. Schumaus, Alexandria, Indiana, State Medical Association Journal, December, 1914.

ETHER IN MEASURED DOSAGE, THE ROUTINE ADMINISTRATION OF. Albert H. Miller, Providence, R. I., International Clinics, Vol. 4, Series 24.

Etherization; Its Influence on General Tuberculous Peritonitis. W. E. SAVAGE, Cincinnati, O., *Lancet-Clinic*, February 6, 1915. (Case Report.)

Savage recounts a case operated on six years ago, for probable perforating appendicitis, in which the exploratory incision revealed a condition of general tuberculous peritonitis. The abdomen was closed without further interference and drainage. The patient made an unexpected and surprisingly rapid recovery and is to-day, apparently, completely restored to health. The only notable feature of the operative procedure was that the induction stage of etherization, by the closed-cone method, was unduly prolonged on account of the patient's shallow breathing, due to the tympanitic condition of the abdomen.

Savage is of the opinion that the result accomplished was due to the minimum amount of oxygen in the body during etherization or to the indirect action of the anesthetic agent. The bacillus of Koch is not only aerobic, but first cultures are difficult to obtain, even the presence of an excess of oxygen. This may account for the fact that the bacillus is seldom found in the tuberculous area proper, but rather in the more vascular structures limiting the tuberculous process. The bacillus in the body, however, gradually adjusts itself to a decreased oxygenation; although acute exacerbations of the tuberculous process are precipitated by surgical interference and exposure of the parts to atmospheric air, as in the opening of a psoas abscess. Granting that deoxidation would most materially influence the activity of the bacillus, clinical observation should record the greatest benefits from deprivation of the oxygen supply, in acute cases, such as tuberculous meningitis, peritonitis and milliary tuberculosis, and this contention coincides with routine experience.

While in the closed cone method of etherization the amount of ether introduced into the circulation is not necessarily excessive, the supply of oxygen is reduced to a minimum. The case reported had a tuberculous peritonitis of one week's standing. When etherized by the closed cone method, the bacilli in her body were bombarded for a very considerable time with a medium practically devoid of oxygen. In short, Savage is of the opinion that the bacilli were asphyxiated. Experimental work along this line has been begun by Prof. Wherry of the Pathological Department of the University of Cincinnati Medical School, and readers of the Supplement will be given the results of his investigations as soon as they are concluded.

Intratracheal Anesthesia, Case of Retroperitoneal Emphysema Following. S. D. Ehrlich, Medical Record, November 24, 1914.

Intratracheal and Endopharyngeal Ether Insufflation Anesthesia. J. H. Evans, Buffalo, N. Y., New York Medical Journal, January 30, 1915.

Intratracheal Administration of Chloroform. W. D. Mart, Lancet, November 7, 1914.

Intratracheal Method of Ether Anesthesia. R. L. Jones, Lancet, November 7, 1914.

Local Anesthesia. F. D. Austin, Charlotte, N. C., Charlotte Medical Journal, January, 1915.

Local Anesthesia in Hernia Operations. C. P. Knight, Stapleton, New York Medical Journal, December 5, 1914.

Local Anesthesia in Hernia and Operations for Lacerated Perineum. R. Duffy, Tampa, Fla., Lancet-Clinic, December 26, 1914.

Local Anesthesia, Hyoscin and Morphin as a Preliminary to. L. M. Hurd, New York, Laryngoscope, November, 1914.

Local Anesthesia in Surgical Operations. A. L. Flemming, Bristol Medico-Chirurgical Journal, September, 1914.

Local Anesthesia, Vaginal Operations under. E. Ruge, Muenchener Medicinische Wochenschrift, December 22, 1914.

Local Anesthesia in the Prevention of After-Pain and Shock. A. E. Hertzler, Kansas City, Mo., *Journal American Medical Association*, December 5, 1914.

Hertzler justly points out that in the presence of preliminary morphinization, the after-pain complained of, consequent to general or local anesthesia, is about the same. It is really the narcotic that accounts for the postoperative well-being of patients. Those who have been operated under both methods prefer local anesthesia because they have escaped the unpleasantness of taking ether. The after-pain following novocain analgesia and nitrous oxid-oxygen anesthesia (without morphin) is about the same, although occasionally the local analgesia will be complicated by postoperative areas of hyperesthesia, too often disregarded by the operator because he fails to comprehend their importance. The analgesic properties of novocain are very evanescent, while those of quinine in combination with urea, have a prolonged obtunding effect, particularly if inflammatory tissue can be avoided, and regional nerve-blocking utilized. Thus, while injections above an individual pile may cause exquisite pain, injection of the pile itself will be followed by a prolonged analgesia. The value of sacral blocking by means of quinine-urea, for operative procedures in the ano-perineal region and lower pelvis cannot be too highly recommended as an effective means of controlling postoperative pain, although the question arises whether such prolonged obtunding of the nervous structures may not effect the healing of the tissues.

The routine use of local analgesia is teaching operators what tissues are especially painful, and if constriction of such painful tissues is avoided, postoperative pain is negligible. This applies to stitching such viscera as the gallbladder, folding of round ligaments, ligation of nerves and particularly tight suturing of the skin. The parietal peritoneum is very sensitive and requires delicate suturing, while the fascia, freed from its prefascial fatty tissue, may be sufficiently firmly sutured to take the strain from the underlying peritoneal approximation. Nerves, accompanying arteries, should not be caught in the ligature. This is particularly essential in ligating the superficial branches of the deep epigastric vessels in operations for hernia. Caution must be exercised in obtunding with quinine-urea hydrochlorid, as too intensive injection may cause a slough or may delay the healing of the tissues.

Enthusiasts err, who maintain that local analgesia obviates shock. It may diminish shock, but surgical traumatism necessitated by certain operative procedures, particularly in the vicinity of sympathetic plexuses, will precipitate shock in the entire absence of any painful sensations on the part of the patient. The abrogation of shock by blocking the rami communicantes, or the sympathetic solar or sacral plexuses is still in the experimental stage. In desperate operations, these shock-precipitating periods of the operation are best done under general anesthesia, preferably nitrous oxid-oxygen, with the addition of as little ether as possible, to avoid its systemic consequences in the presence of complicating acidosis from pre-existent disease.

While Hertzler agrees that anoci-association methods counteract emotional shock, he cannot subscribe to Crile's enthusiasm regarding the complete efficacy of quinine-urea hydrochloride as a postoperative obtunding agent, nor does he feel that anoci-association, as cursorily practiced by many surgeons, abrogates shock. By emphasizing the changes in the brain-cells, Crile removes from the term "shock" its clinical meaning and substitutes an unproved hystologic hypothesis. In many of the gravest operative procedures it is impossible to obtund the inflammatory or malignantly degenerated tissues, and the prevention of shock in these cases must depend upon the deftness of the operator, his ability to judge conditions correctly in order to manage them with the least possible traumatism in the shortest time and with the least loss of blood.

Magnesium Sulphate Narcosis, Treatment of Tetanus with. W. Weinstrand and E. Unger, Berliner Klinische Wochenschrift, October 19, 1914.

Narcosis. W. Guy, Edinburgh, Dental Cosmos, December, 1914.

Nitrous Oxid-Oxygen Anesthesia. W. Hamilton Long, Louisville, Ky., Kentucky Medical Journal, November 15, 1914.

Nitrous Oxid-Oxygen in General Surgery and Obstetrics. Charles K. Teter, Cleveland, O., Lancet-Clinic, December 12, 1914.

Novocain-Suprarenin Anesthesia, Further Studies in. R. H. Reithmüller, Philadelphia, Pa., Dental Cosmos, December, 1914.

Postanasthetic Glycosuria as Influenced by Diet, Body Temperature and Purity of Ether. E. L. Ross, Chicago, and P. B. Hawk, Philadelphia, Archives of Internal Medicine, December, 1914.

Postanasthetic Glycosuria, Purity of Ether and Diet, Responsiblity for. Editorial, Journal of the American Medical Association, February 20, 1915.

Postanasthetic Nauseau, New Method of Controlling. J. E. Lumbard, New York, Medical Record, December, 1914.

Postoperative Paresis of the Stomach and Intestines. A. Peiser, Beitrage zur Klinische Chirurgie, XCIII, No. 3.

Resuscitation, Means of, for Alarming Conditions Brought About by Anesthetic Agents. E. M. Sanders, Nashville, Tennessee State Medical Journal, October, 1914.

Sacral Anesthesia. Karl E. Schloessingk, Freiburg, Germany. *Illinois State Journal*, February, 1915.

Speaking before the Anesthetic Congress recently held under the auspices of the Chicago Academy of Medicine, Schloessingk stated that in the Freiburg Clinic they were using the sacral anesthesia technic developed by Laewen with considerable success in operative procedures in the ano-perineal and genital regions.

The injection is made with the patient in the sitting posture, with the object of retaining the analgesic agents in contact with the dural sheaths as long as possible. The point of puncture lies in the center of an imaginary vertical line drawn from the apex of the sacral triangle to its base. The hiatus sacralis and sacral cornua assist in the localization. A skin wheal is first raised, then the sacral membrane is pierced by the needle, which is slowly insinuated along the sacral canal, being carefully guided along the curves. Having reached a depth of 6 cm., 20 c.c of a 2 per cent. novocain solution with sodium bicarbonate and sodium chloride, and 5 drops of 1:1000 adrenalin solution, should be very slowly injected, from 2 to 5 minutes being consumed. Accidental injection into a vein will usually result in almost immediate respiratory embarrassment; while too concentrated a solution or too rapid an injection may accelerate the pulse and precipitate giddi-

ness, vomiting, or even collapse. Whilms recommends the preliminary injection of 20 c.c of saline solution to limit the absorption of the novocain.

The maximal analgesia is attained in about twenty minutes. Analgesia presents first between the coccyx and posterior border of the anus. From this point it spreads over the perineum and skin of the scrotum to the penis and glands, or over the vulvae and into the vagina. Analgesia may extend to the pubes and gluteal region, and as deep as the cervix of the uterus. The testicles remain sensitive. Occasionally an error in technic results in hemianesthesia. Schlimpert and Schneider have observed an extension of the anesthesia to the level of the umbilicus when using the high pelvic position to promote a higher diffusion of the injected solution. Analgesia usually persists one and a half to two hours, though the period is variable, Laewen regards the administration of more than 0.4 grm. of novocain into the epidural cavity as risky. Also preliminary alkaloidal medication is necessary.

Sciatica, Treatment of by Perineural Infiltration with Physiologic Saline Solution. W. M. LESZYNSKY, New York City, *Medical Record*, February 6, 1915. (Ibid) I, Strauss, New York City.

Owing to the fact that Leszynsky has cured cases of acute sciatica with perineural injections of physiologic saline solution, he is inclined to attribute his favorable results to blocking of sensory conductivity or to the pressure and absorption of the fluid, producing changes in the circulation and nutrition of the perineural structures, rather than to the mechanical action of the fluid in loosening, stretching or breaking-up adhesions in the vicinity of the nerve.

His technic is as follows: During the application of the treatment the patient should lie on the abdomen with legs fully extended, and the feet projecting beyond the edge of the table. A firm pillow is rolled and placed under the lower part of the abdomen in order to favor relaxation of the gluteal muscles. For the purpose of locating the nerve the following measurements are made: A line is drawn from the sacrococcygeal articulation to the posteroexternal border of the great trochanter; at the junction of the inner one-third and the outer two-thirds of this line is found the spine of the ischium. One inch to the outer side of this point we locate the point of puncture. An area of the skin about 4 cm. in diameter is then painted with iodine, the point of puncture being in the center. The syringe used is all metal, holding 60 cc. It has a slip tip which allows the needle to fit the barrel directly. The needle is of steel, 12 cm. long, with a caliber of 2 mm., and provided with a sharp point, which is protected by a dull-tipped stylet projecting 1 mm. beyond the point of the needle. In puncturing the skin and subcutaneous tissue, the stylet is withdrawn beyond the cutting edge. It is then replaced, and the needle pushed in perpendicularly. When the sciatic nerve is reached, at a depth ranging from 6 to 12 cm., the patient may feel either a sharp pain radiating from the point of contact to the popliteal space or down to the foot; or, a sharp pain in the corresponding heel; or, there may occur a jerking movement of the leg; or, a sudden twitch in the calf muscles. Some patients complain only of diffuse pain in the buttock. The stylet is then removed. The syringe having been filled with sterile physiological saline solution at a temperature between 95 degrees and 100 degrees F., the fluid is rapidly injected. The quantity used is from 80 to 120 cc. The needle is then quickly withdrawn, the iodine washed off with alcohol, some collodion applied over the point of puncture, and this is covered with a small strip of sterile adhesive plaster. The patient is then instructed to lie abed and rest for twelve to twenty-four hours. No anesthetic is required. Strict aseptic precautions are absolutely essential. Soon after the injection, some aching pain with a sensation of heaviness and numbness in the limb usually follows, but this lasts only a short time. In some cases the sciatic pain in the thigh disappears within twenty-four hours, but the patient complains of pain continuing in the leg in the course of the peroneal nerve. This is often promptly relieved by an injection of 15 to 30 cc. in the region of the nerve at the head of the fibula. The interval following the first injection, before another is given, will vary according to the degree of relief obtained. He has been in the habit of waiting from thirty-six hours to one week before repeating the injection.

Lange declares that after a large experience with all of the available and conventional remedies this method has proved in his hands the most valuable therapeutic acquisition.

As a rule, the injection of saline solution under pressure, in quantities ranging from 60 to 120 cc. or more, is attended with comparatively slight pain. This usually arises during the early period of the injection. As soon as heaviness and numbness in the extremity are felt, no further pain results from the introduction of additional fluid. In the majority of instances the treatment is not painful. At the time of the first injection fear and apprehension often render some patients less manageable than others. Usually when additional injections are required, these elements of discomfort have become eliminated, and there is no further difficulty. It should be borne in mind that our object is to produce infiltration of the nerve and the surrounding structures. It is not intended that the nerve sheath should be entered by the needle. Should such a large quantity of fluid be forced into the trunk of the nerve, disagreeable consequences, such as paralysis and traumatic neuritis, would probably ensue. In the construction and use of the special needle precautions are taken to avoid puncturing a blood-vessel or the nerve sheath.

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